Annual Report 2005

Department of Materials Science and Engineering
# Table of contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Editorial</td>
<td>3</td>
</tr>
<tr>
<td>International Courses</td>
<td>4</td>
</tr>
<tr>
<td>Science Stories</td>
<td>6</td>
</tr>
<tr>
<td>Publications</td>
<td>15</td>
</tr>
<tr>
<td>Equipment</td>
<td>21</td>
</tr>
<tr>
<td>Guest Lecturers</td>
<td>23</td>
</tr>
<tr>
<td>Staff</td>
<td>25</td>
</tr>
<tr>
<td>Graduate Studies</td>
<td>28</td>
</tr>
<tr>
<td>Course Program</td>
<td>35</td>
</tr>
<tr>
<td>Graduated M.Sc.Students with Titles of their Work</td>
<td>37</td>
</tr>
<tr>
<td>M.Sc.Students</td>
<td>40</td>
</tr>
<tr>
<td>Extracurricular Activities</td>
<td>41</td>
</tr>
</tbody>
</table>

Picture on front page: Detail of samurai sword. Foto: Pål Ulseth.

Annual report for
Department of Materials Science and Engineering
Norwegian University of Science and Technology
NO-7491 Trondheim, Norway

Internet address: http://www.material.ntnu.no/2005

---

The editor thanks

- Brit Meland, Åse Lill Salomonsen, Hilde Martinsen Nordø, Martha Bjerknes and Trond Einar Hagen for collecting the administrative data
- Trygve Foosnæs and Pål Ulseth for photographic work
- Inger Reistad Rygh and Raymond Nilsson at SINTEF Media for layout
- Grøset for printing
From the editors

The annual report from the Department of Materials Science and Engineering (DMSE) consists of two parts. The first part comprises Science Stories, Publication List and List of Equipment and is primarily intended for external readers. The second part is intended for the archives.

DMSE is an average sized department at NTNU with respect to the number of academic and technical staff. However, taking into consideration PhD students and post docs engaged in the research project portfolio, DMSE is a rather large department. DMSE has 19 professors, 4 associate professors, 12 adjunct professors, 14 professor emeritus, a technical and administrative staff of 21, and finally 76 PhD students, post doctoral fellows and researchers.

The management of the Department changed in August when professor Lars Arnberg and professor Tor Grande resigned as Department Head and Deputy Department Head respectively. Tor Grande was elected the new Department Head and professor Knut Marthinsen the new Deputy Head.

One of the laboratories of the Department, Chemistry Building II was completely renovated during the year and the whole group of Inorganic Chemistry was temporarily relocated in Chemistry Building I. The renovation was completed in December and the group could move back into very modern, well equipped laboratories. Also the group of Electrochemistry moved into the new laboratory and the department is now basically located in just two buildings.

The Department receives students from two sources: The Materials Technology students are enrolled from their first year. Students from the program of Chemistry and Biotechnology which specialise in Materials chemistry and energy technology are enrolled from their third year. In addition the department recruits students from the Norwegian Colleges and the international master program in Light metal production. The trend of increasingly better enrolment to Materials Technology continued also in 2005.

60 students applied with Materials Technology as their first choice and 30 were admitted to the program. The department is also responsible for all teaching in general chemistry for engineering students, about 800 in total.

The number of candidates graduating from the Department has increased in recent years. The PhD degree has been granted to 14 candidates this year compared to 11 in 2004. 33 students have completed their Master of Science degree compared to 19 in 2004. 53 PhD students and 29 Master students are in progress.

The 24th International Course on Process Metallurgy of Aluminium, arranged from May 18 to 27, had an attendance of 73 participants from 27 countries. The course of Fundamentals and their application in aluminium production had an attendance of 36 participants from 12 countries. A one week course, Solar Cells – Power of the Future was arranged by the Department in cooperation with the Board of European Students of Technology. The course attracted 26 students from 15 European countries.

A number of senior professors at the department have retired over the last few years, the last in the row was professor Harald Øye in 2005. A new generation of faculty members is being recruited. In 2005, Svein Sunde was hired as a Professor of Electrochemistry, Kjell Ove Kongshaug was hired as an Associate Professor of Nanotechnology, Jarle Hjelen as a Professor of Physical metallurgy and Lifeng Zhang as a Professor in Process metallurgy.

Professor emeritus Nils Ryum was awarded “Sam Eyde-Fondet/ Polyteknisk Forening’s Jubileumspris 2005” and Professor emeritus Harald A. Øye received the “Polyteknisk Forenings Hederspris”.

The number of publications in peer reviewed journals in 2005 is 70. The annual budget of the Department is now actually dependent on the number of publications in addition to the number of PhD and Master Candidates, and DMSE are one of the Departments at NTNU with the highest average number of publication per faculty annually.

The Department has a close cooperation with SINTEF, resulting in a new Gemini Center, Solar cell Materials, in 2005. The Department also has a close contact with Norwegian and international Industry.

Lars Arnberg and Tor Grande
International courses

Solar Cells – Power of the Future
Summer course 2005
26 students from 15 countries.
The 24th International Course on Process Metallurgy and Aluminium
May 30 - June 3, 2005, 73 participants from 27 countries.

Fundaments and their application in aluminium production
May 18 - 27, 2005, 36 participants from 12 countries.
Historical metallurgy in Trøndelag

The early process for ironmaking, based upon a shaft furnace with slag pit has been documented at some 300 sites in the province of Trøndelag.

Ongoing metallurgical research at the department is directed towards development of new and better materials, the economic use of energy, reclaiming of waste material etc. However, as long as a university also covers subjects such as history, archaeology, geology and ethnology the department has a role to play.

The early process for ironmaking, based upon a shaft furnace with slag pit has been documented at some 300 sites in the province of Trøndelag. 50 - 100 tons of slag have been found at each site, representing about the same amount of metal. The production reached a peak around year 200. For some reason this technology was abandoned around year 600 AD while a new process with smaller, side-tapped furnaces was introduced around 800 AD. However, this type, so common in the Østland area north and west of Oslo, has hardly been registered north of Gauldalen. Nobody has been able to reproduce these two early processes. As a paradox they were in full use in “primitive” societies of the past.

These problems have been the subject of a project between the department and Gauldal Secondary School where the students have made charcoal in a large kiln and fetched bog iron ore as well as characteristic clay at selected places.

The raw materials have been studied by chemical analysis, XRD and other methods in the university. The clay has been tested as a raw material for pottery, as an introduction to the manufacturing of a ceramic shaft. Ironmaking will follow.

Arne Espelund

Fig. 1. Bloom weighing some 7 kg, 14C dated to about year AD 800 found in Lårdal, Telemark. It is nearly slag-free with a certain porosity, with excellent properties in spite of being produced in the solid state. Photo: A.E.

Fig. 2. The best preserved “medieval” furnace found in Norway until now. Photo: M. Thorkildsen.
In-situ deformation of aluminium in the SEM

A new meso- to micro scale approach to explore texture evolution.

Modern production of cars demands a high degree of automation involving tight tolerances of the various components. This is challenging the extrusion industry, since extruded profiles often have strong microstructure- and texture gradients through the thickness, and these gradients affect the mechanical anisotropy.

In order to understand how gradients affect the mechanical anisotropy, one can investigate how the microstructure and texture in the different sections through the thickness evolve during deformation. Such studies can now be performed by applying a specially developed in-situ deformation technique. Here the microstructure of the specimens, deformed by simple tension inside the chamber of a SEM, is mapped by an Electron Back-Scatter Diffraction (EBSD)-technique. The electron beam scans an area of interest and the crystal orientations are automatically calculated on the basis of an electron diffraction pattern from each pixel. This technique provides information about basic deformation mechanisms including deformation gradients, identification of active slip systems and lattice rotations on the grain and sub-grain level. The knowledge from such investigations helps understanding anisotropic plastic flow which in turn premises the formed shape (and tolerances) of extruded profiles. Some examples from the work of PhD student Hans Bjerkaas as shown in the figures. The material studied is an extruded AA6063 profile. The left EBSD-map shows the microstructure before deformation: Most of the grains have a red colour indicating a <100> direction parallel to the extrusion direction (the crystallographic direction parallel to extrusion direction is given by the colour coding in the triangle). The pole figure underneath the left micrograph shows presence of a strong cube texture, i.e. the three <100> directions are parallel to the extrusion-, transversal- and normal direction respectively. The micrograph shows an EBSD map of the same area after 17% deformation. The grain shapes and the colours within the grains have changed, indicating lattice rotations during plastic deformation. The pole figure underneath the micrograph shows the corresponding development of the crystallographic and the new texture components. The studies have shown that in-situ deformation can be a powerful tool when characterizing local texture development upon plastic deformation behaviour of industrial alloys.

Hans Jørgen Roven and Jarle Hjelen
Nanostructured silica materials

Silica aerogel is one of the world’s lightest materials. 2005 marked the end of the EU-project HILIT+. The main goal of this project has been to demonstrate an efficient environmental-friendly process for the preparation of 60x60 cm aerogel insulated windows. The project consortium consisted of 9 partners from France, Germany, Denmark and Sweden in addition to NTNU and was a follow-up from previous EU-projects.

Silica aerogel which is among the world’s lightest material, is consisting of a network of nanosized silica particles as shown in Fig. 1. The porosity can be up to 98 %. The pore size is in the meso-range giving a material which is transparent and with a very low thermal conductivity. Surface area can be as high as 1000 m²/g. The aerogels were fabricated by a sol-gel route using polyethoxydisiloxane precursors followed by supercritical drying from CO₂ to avoid fracture and shrinkage during drying.

Due to the high porosity, both the wet gels and hence aerogels have a low mechanical strength and our main contribution to the project has been to increase the strength of the wet gels. The strategy to increase the strength has been to age the wet gels in different liquids where partial solubility of silica is promoted. During the aging, dissolved silica is transported to the necks in between the particles.

Mechanical characterization of wet gels has been performed by 3-point beam bending shown in Figure 2 where modulus of rupture, sheer modulus and permeability of the wet gels have been measured. Through the HILIT+ project several 60x60 cm² demonstration windows have been made. Figure 3 shows a smaller demonstration window.

Mari-Ann Einarsrud
Porosity development in anodes for primary aluminium production

A new application of Image Analysis – Porosity Measurements.

The development of porosity in green composite carbon materials is important for their chemical and physical properties in the baked state. In the Hall-Héroult process an unfavourable pore size distribution and structure is detrimental to the anode consumption. Pore development depends on the raw materials and on the paste production process. Pitch and coke particles must be distributed evenly and smaller particles fitted into the voids between larger particles in order to obtain a homogeneous paste. If not, intraparticle porosity will increase, and the paste will contain a higher amount of trapped air and volatiles at the forming stage thus leading to excessive porosity development during baking. Anode consumption has mainly been addressed by studies of catalytic activity and little or no attention has been paid to structure and porosity, due to the complexity of the green state and a lack of good analytical methods.

Our image analysis technique is a valuable tool for studies of both the green and the baked state of carbon materials and is in this work used for porosity determination. A continuous pore size distribution from 1 µm to 10 mm is registered and the method thus covers a larger range than mercury porosimetry. Pilot-scale anode samples were produced from a single source petrol coke in a five-factorial experimental design with the variable factors pitch content, aggregate size distribution, mixing time, mixing techniques (sigma blade and intensive mixers), and heating rate during baking. The mixing technique and the pitch content have the strongest impact on both the porosity and the specific electrical resistivity of the anodes. Intensive mixing results in higher apparent density as can be seen in Fig. 1.

Fig. 2 shows averaged pore size distribution curves. Conventional mixing of 14 % pitch anodes shows large pores due to aggregate crushing and void formation during the mixing and the forming stage. In the case of intensive mixing, less of the small pores (8-40 µm) are present. This is due to better filling and impregnation of coke particle pores and interparticle voids with pitch. With increasing pitch content more pitch is available in the intergranular space to penetrate the coke pores and to form thicker binder coke films around the coke particles. In this case the pore size distribution curves tend to peak around 100 µm which is typical for pitch coke where pores form by escaping volatiles.

Conventional mixing results in less homogeneous and more porous anodes compared to intensive mixing (Fig. 3). The intensive mixer provides higher dynamic pressure gradients that result in improved filling and impregnation of pores and voids. In the conventional mixer the coke particles are crushed during mixing. This causes binder deficiency and thus higher porosity.

Michal Tkac and Trygve Foosnæs
ULCOS – ultra low CO₂ production of iron and steel

The production of iron and steel causes large emissions of CO₂. Electrolysis by using an inert oxygen evolving anode represents an attractive alternative.

The department is a partner of ULCOS, one of the largest projects supported by the EU. The primary goal of the project is to develop a new process to produce iron and steel with strong reduction of the emissions of CO₂.

The iron and steel industries are major contributors to the emissions of CO₂, which is regarded as the most important greenhouse gas. About 1000 million tonnes of iron is produced annually in blast furnaces and electric arc furnaces. The emissions from a blast furnace amount to about 2 kg CO₂/kg Fe.

Several routes to reduce or eliminate CO₂ emissions are being studied in the ULCOS project. The Department of Materials Science and Engineering participate in two different subprojects of ULCOS. One group is involved with studies of iron production by using natural gas. The other is investigating electrolysis, which is one of the more dramatic alternatives to produce iron. Electrolysis using an inert oxygen evolving anode will completely eliminate CO₂ emissions for the production process if the electric energy can be produced from renewable sources of energy. Electrolysis can be carried out in aqueous electrolytes, molten salts or molten oxides. The work in Trondheim has been focused on the use of molten salt electrolytes.

The major challenges have been to find an electrolyte which dissolves enough hematite to allow for a high current density for electrodeposition of iron and to obtain smooth electrodeposits of iron. Several electrolytes were tested, including molten chloride mixtures based on CaCl₂, pure fluoride and mixed chloride/fluoride electrolytes. The performance of candidate inert anode materials to evolve oxygen was tested during electrolysis. Electrodeposits of pure iron were obtained in many electrolytes. The most promising results were obtained in the molten system KF-NaF-CaCl₂. The solubility of Fe₂O₃ was determined to be of the order of 0.5 - 1 mol% in melts containing ~10 mol% CaCl₂. In these electrolytes pure iron was deposited at current densities exceeding 0.5 A/cm² using a rotating Fe cathode to increase the rate of mass transfer of Fe(III) species. The current efficiency with respect to iron was consistently found to be above 95%.

Geir Martin Haarberg

Cathode deposit being removed from steel substrate shortly after electrolysis in molten KF (60 mol%) - NaF (40 mol%) - Fe₂O₃ (1 mol% added) at 865°C.
Fluidity of Al foundry alloys

An improved fluidity test method for studying the parameters affecting fluidity in Al foundry alloys.

Foundry and automotive industries are concerned with the fluidity of their alloys because this affects the soundness and quality of their cast products. Poor or insufficient fluidity results in an increased rejection rate of cast products and limits their cross section. The higher the fluidity of an alloy, the thinner is the mould-wall that can be achieved.

The term “fluidity” in the foundry is used to indicate the distance a molten metal can flow in a mould of a constant cross-sectional area before it solidifies. Fluidity in foundry is a complex technological property and it depends upon many factors, e.g., chemical composition, solidification range, heat of fusion, casting temperature (superheat), mould coating, oxide/particle content.

The first fluidity test appeared in 1902 and, since then, several equipments for fluidity testing have been developed and modified. However, there is still a need for a reliable fluidity test.

An improved fluidity test method has been developed and tested in cooperation with SINTEF Materials and Chemistry. The geometry of the fluidity spiral method is shown in Fig.1. Due to an automatic control of the casting temperature and pouring height, the system provides constant superheat and pressure head which allow for highly reproducible fluidity measurements. This fluidity method has been used to study many factors affecting fluidity such as casting temperature, oxide content, mould coating, grain refinement etc.

Fig. 2 shows the team from the department and SINTEF that has carried out the work and is a part of the program NorLight, which involves many Norwegian industries and international cooperation. Figs. 3 and 4 show some of the most important results of this work. The increase of the casting temperature (hence melt superheat) increases the fluidity of an Al-7wt%Si alloy (Fig. 3). The addition of 20% turning chips (recycled material from FUNDO WHEELS AS) to a standard A356 alloy increases both inclusions and oxides content, and decreases fluidity.

Marisa Di Sabatino and Lars Arnberg

Fig. 1 Geometry of the fluidity spiral.

Fig. 2 Alf Sandberg, Freddy Syvertsen, Marisa Di Sabatino and Arne Nordmark. Marisa`s PhD thesis is an example of the good cooperation between NTNU and SINTEF. She has performed most of her experimental work at the foundry lab in Perleporten at SINTEF Materials and Chemistry.

Fig. 3 Fluidity vs temperature. The graph shows the influence of increasing casting temperature (hence melt superheat) on fluidity of an Al-7wt%Si alloy.

Fig. 4 Fluidity length for two alloys: a standard A356 alloy and the same alloy with the addition of 20% turning chips (recycled material from FUNDO WHEELS AS). The level of inclusions for each alloy is also reported.
Components for the transport industry

High pressure die casting – an example of a good collaboration between industry and university research.

High Pressure Die Casting (HPDC) is a well established casting method, particularly suited for fully automatic, high productivity, high volume production of complex near net shaped parts with weights ranging from a few grams to more than 15 kilograms. The transport industry shows a great interest in this technology because the technique offers light metals solutions with the integration of many functions into one part. The new trend is to use modern modeling technology to develop the process further to obtain better properties of the products and with less variation in properties than before. The market grows annually at about 10%.

Norsk Hydro has installed a modern, well equipped 420-ton cold chamber HPDC machine at the plant in Porsgrunn. Melting and melt treatment facilities are set up nearby to make pilot scale casting easy and performed at an optimum way. The institute has the option to use these facilities for practical education of students in casting and for research. This enables the institute to do pilot scale casting experiments of a high numbers of castings effectively, with good documentation of process parameters and with melts pretreated at specifications. Joint use of this equipment and collaboration on projects is to mutual benefit for the quality of work and research.

Projects on high pressure die casting at the department include investigations on how process parameters influence structure and properties of cast components, and investigations of heat transfer between the die and the cast metal.

Otto Lohne and Lars Arnberg
Microstructure control of steels through dispersoid metallurgy

Non-metallic particles are considered detrimental to steel – but not if they are small and numerous.

Development of the first generation of grain refiners for steels is based on the experience that oxides and sulphides of rare earth metals can effectively be transferred to liquid steel via ferroalloys containing small inclusions – dispersoids and these dispersoids will then provide a finer grain size in the cast steel. These particles are often remarkably persistent and can survive in the steel melt for an appreciable period of time without loss of identity.

A master alloy containing a high number density of dispersoids in the 1µm size range, is added to a clean steel melt being low in oxygen and sulphur. The master alloys can be produced in two different ways:

1) The melting & quenching route means that the alloy components first are mixed and melted in an induction furnace and then rapidly quenched to achieve the desired distribution of the dispersoids in the grain refiner

2) The value-added DRI (Direct Reduced Iron) method involves mixing of iron oxide powder with other metals or oxides. The pellets made from these blends are subsequently reduced in a controlled atmosphere at high temperatures to remove excess oxygen from the master alloy, leaving behind a fine dispersion of stable oxides in the iron matrix. Figure 1 shows scanning electron microscope (SEM) images of two sulphur-based master alloys produced via the melting & quenching route.

The question whether the MnS dispersoids could be converted to CeS or some other reaction product following dissolution of the sulphur-based master alloy into a clean steel melt containing cerium in solution has been done using the master alloy shown in Fig. 1 (a). The steel was cast immediately after the addition was made. In some cases it was also possible to observe the conversion of MnS to CeS as can be seen in Fig. 2 (a).

Øystein Grong and Leiv Kolbeinsen

**Fig. 1.** SEM backscattered electron images showing the distribution of MnS dispersoids in two different sulphur-based master alloys. Both are produced via the melting & quenching route, but are quenched at different cooling rates from the solution temperature: (a) Fast cooling in a thin quartz tube, (b) Rapid solidification using the melt spinning technique.

**Fig. 2.** SEM secondary electron images showing how the MnS dispersoids behave after they are brought in contact with the liquid steel containing cerium in solution: (a) By promoting an exchange reaction between Mn and Ce resulting in the formation of an outer shell of CeS and an inner core of MnS, (b) By forming a multiphase particle through reactions with dissolved oxygen which consists a split oxysulphide core with patches of MnS at the surface.
The following activities were offered by the Department of Materials Science and Engineering:

**Stands**

- **“Ceramic Materials – from ski slopes to mobile phones”**
  Exhibition of various useful and useless artifacts where the use of ceramic materials is important. Poster showing preparation and applications of ceramic materials. Demonstration of the strength of ceramic materials where visitors were encouraged to fracture a materials specimen (M.-A. Einarsrud, H. L. Lein, Ø. Andersen, T. Mokkelbost)

- **“Materials competition”**
  The audience was asked to identify 36 materials (H. Karoliussen).

- **“HYMEN Bonding”**
  Demonstration of cold welding of aluminium with hands on experience for visitors; demonstration of equipment developed by NTNU/SINTEF for extruding and joining of plates and profiles; PC simulation (Ø. Grong, A. Lilleby, T. Erljen, H. Hemmer).

- **“The Secret of the Samurais”**

**Lectures**


- **“Demonstration Lecture 1”**, (M. Ystenes)

- **“What really is Fireworks?”**, (M. H. Larsen)

- **“Demonstration Lecture 2”**, (T. Foosnæs)

At the stands, the audience got to see and also feel the sometimes amazing properties of materials. All stands and lectures were very well attended by many of the close to 600 enthusiastic visitors in the Science Building that night.
Publications in refereed journals and books

Albertsen, J. Z.; Grong, Ø.; Mathiesen, R.; Schmid, B.:
Metallurgical investigation of metal dusting corrosion in
plant-exposed nickel-based alloy 602CA.

Rørmark, L.; Stevens, R.; Stalen, S.:
Entropy of oxidation and redox energetic of CaMnO3-δ.

Nes, E. A.; Pedersen, K. O.:
FEM and a microstructure based work hardening model used to
calculate forming limit curves.

Bjerkaas, H.; Fjeldbo, S. K.; Roven, H. J.; Hjelen, J.; Furu, T.:
Age-hardening and plastic anisotropy in extruded AlMgSi and
AlMgZn profiles.
TMS MPMD 6th Global Innovations Proceedings: Trends in Materials
and Manufacturing Technologies for Transportation Industry and
Powder Metallurgy Research and Development in the Transportation

Valøen, L. O.:
Structural and electrochemical characterization of a melt spun
AB5-type alloy.

Castrillejo, Y.; Bermejo, M. R.; Barrado, A.I.; Pardo, R.; Barrado, E.;
Martinez, A. M. C.:
Electrochemical behaviour of dysprosium in the eutectic
LiCl-KCl at W and Al electrodes.

Castrillejo, Y.; Bermejo, M. R.; Diaz Arocas, P.; Martinez, A. M. C.;
Barrado, E.:
Electrochemical behaviour of praseodymium(III) in molten
chlorides.

Castrillejo, Y.; Bermejo, M. R.; Diaz Arocas, P.; Martinez, A. M. C.;
Barrado, E.:
The electrochemical behaviour of the Pr(III)/Pr redox system
at Bi and Cd liquid electrodes in molten eutectic LiCl-KCl.

Chmelar, J.; Foosnäs, T.; Øye, H. A.; Sandvik, K. L.:
Coke quality effect on the grinding in an air swept ball mill
circuit.

Di Sabatino, M.; Arnborg, L.:
Effect of grain refinement and dissolved hydrogen on the
fluidity of A356 alloy.

Di Sabatino, M.; Arnborg, L.; Bonollo, F.:
Simulation of fluidity in Al-Si alloys.

Di Sabatino, M.; Arnborg, L.; Rørvik, S.; Prestmo, A.:
The influence of oxide inclusions on the fluidity of an
Al-7wt%Si alloy.
Materials Science and Engineering A - Structural Materials properties

Di Sabatino, M.; Syvertsen, F.; Arnborg, L.; Nordmark, A.:
An improved method for fluidity measurement by gravity
casting of spirals in sand moulds.

Dumoulin, S.; Roven, H. J.; Werenskiold, J. C.; Valberg, H. S.:
Finite element modeling of equal channel angular pressing:
Effect of material properties, friction and die geometry.
Materials Science and Engineering A - Structural Materials properties

Ellertsen, J. L.; Støvneng, J. A.; Ystenes, M.; Rytte, E.:
Activation of metallocenes for olefin polymerization as
monitored by IR spectroscopy.

Espelund, A. W.:
Bondejern i Norge.

Espelund, A. W.:
Ei bokmelding om gammalt jern.

Stress-strain behavior during compression of polycrystalline
La$_2$xCaCoO$_3$ ceramics.

Fossdal, A.; Einarsrud, M.-A.; Grande, T.:
Mechanical properties of LaFeO$_3$ ceramics.

Fossdal, A.; Einarsrud, M.-A.; Grande, T.:
Phase relations in the pseudo-ternary system La$_2$O$_3$-SrO-Fe$_2$O$_3$.

Friis, J.; Jiang, B.; Marthinsen, K.; Holmestad, R.:
A study of charge density in copper.
Acta Crystallographica. Section A, Foundations of crystallography

Nisancioglu, K.:
In-situ ellipsometric and electrochemical characterisation of
oxide formed on aluminium in acetate buffer.
3953-3957.

Görner, H.; Syvertsen, M.; Øvreelid, E. J.; Engh, T. A.L.:
MF$_3$ as an aluminium filter medium.


Proceedings of the international conference of advances in solidification processes.

Bermejo, M. R.; Castrillejo, Y.; de la Rosa, F.; Barrado, E.; Martinez, A. M. C.
Electrochemical behaviour of erbium in the eutectic LiCl-KCl at W and Al electrodes.

Bjerkaas, H.; Fjeldbo, S. K.; Hjelen, J.; Roven, H. J.
Texture and microstructural gradients in an extruded aluminium profile.
EDAX-TSL (2005).

Castrillejo, Y.; Bermejo, M. R.; Martinez, A. M. C.; Barrado, E.; Diaz Arocas, P.
Application of electrochemical techniques in pyrochemical processes. Electrochemical behaviour of rare earths at W, Cd, Bi and Al electrodes.

de Bruyn, H.; Schmid, B.; Grong, Ø.; Albertsen, J. Z.
Adapting metal dusting research to trends in syngas technology.

Desta, Surafel Ketema; Gjørv, Odd E.; Justnes, Harald.
Utilization of Ethiopian natural pozzolanic materials in concrete.

Di sabatino, M.; Shankar, S.; Apelian, D.; Arnberg, L.
Influence of temperature and alloying elements on fluidity of Al-Si alloys.

Espelund, A. W.
Fra berggrunn og jordsmonn i Rørostraktom - med tillegg fra Folldal - Alvdal i sør til Tydal i nord.

Espelund, A. W.
Industrigründeren Evenstad.
Adresseavisen (2005), June 24.

Espelund, A. W.
Lite kjent kobberhistorie.
Adresseavisen (2005), January 28.

Espelund, A. W.
Nedre Leirfoss på 1800-tallet.
Adresseavisen (2005), March 17.

Espelund, A. W.; Johannessen, L.
Malm, slagg eller noe midt i mellom? I: Fra funn til samfunn.

A numerical study on the onset of plastic instability in extruded materials with strong through-thickness texture variation.

Foss, M.; Seiersten, M.; Nisancioglu, K.
Effect of scale inhibitors on the precipitation and growth of FeCO₃ on carbon steel.

Gulbrandsen, E.; Granå, A.; Nisancioglu, K.
How does fluid flow affect performance of CO₂ corrosion inhibitors?

Hoel, J. O.; Rong, H. M.; Røe, T.; Øye, H. A.
Method for production of trichlorosilane and silicon in the production of trichlorosilane.

Holmedal, B.; Engler, O.; Nes, E. A.
Modelling dynamic strain ageing in aluminium magnesium alloys.

Johnsen, K. A.; Kolbeinsen, L.; Eriksen, D.; Grace, J. R.
Sorption-enhanced steam methane reforming in fluidized bed reactors.

Kolbeinsen, L.
Dispersoids and their effect on solidification structure.

Laukli, H. I.; Lohne, O.; Arnberg, L.
High pressure die casting of aluminium and magnesium alloys - some comparisons of microstructure formation.

Lohne, O.; Ulseth, P.
SINTEF Report STF80; A05346 (2005).

Marshall, A.; Børresen, B.; Hagen, G. K.; Tstrup, M.; Tunold, R.
Hydrogen production by advanced PEM water electrolysis - reduced energy consumption by improved electrocatalysis.
Proceedings of the 18th International Conference on Efficiency, Cost, Optimization, Simulation and Environmental Impact of Energy
Moen, K.; Malvik, T.; Hjelen, J.; Breivik, T.: 
Particle texture analysis in process mineralogy. 

Nesbø, H.; Roven, H. J.: 
Severe plastic deformation (SPD) for ultrafine grained Al alloys - properties and potentials for innovation. 

Palcut, M.; Wiik, K.; Grande, T.: 
Determination of Mn3+ diffusion in LaMn3+ based on solid state reaction. 

Kjøkkenkjemi - en samling enkle kjemierspitioner. 
ISBN 82-92088-29-6. 120 pp.

Roven, H. J.: 
Nanorevolusjon i aluminium. 
Teknologi & Verkstedindustri (2005), February 10.

Rudberg, E A; Wiik, K.; Svensson, A. M.; Nisancioglu, K.: 
Measurement and interpretation of oxygen diffusion and surface exchange data for strontium doped lanthanum cobaltite. 

Stølen, S.; Grande, T.: 
Realfag og kreativitet – en motsetning? 

Seland, F.: 
Miljøvennlig forsker. 
Vennesla Tidende (2005), December 13.

Electrowinning of cobalt from chloride solution – a pilot plant study. 

Zhang, L.: 
Continuous casting operation and steel cleanliness control. 

Zhang, L.: 
Application of computational fluid dynamics to process metallurgy system. 

Electrowinning of cobalt from chloride solution – a pilot plant study. 
Przemysław Szczygieł and Mari Bakken polishing metallographic samples.

Lars-Erik Owe performing electrochemical measurements.
EXTRACTIVE METALLURGY

Furnaces
- Crucible furnace, capacity 140 kg aluminium; with gas purging unit etc. for metal, refinery studies.
- Induction furnace, capacity 200 kg of steel, Eloterm.
- Induction furnace, capacity 20 kg of steel, ASEA.
- Vacuum induction furnace, capacity 2 kg of steel, Balzer.
- Plasma pilot facility/furnace, capacity 30 kg/h and plasma temperatures up to ~3000°C.
- Electro-melting furnace, one-phase current, for pilot production of metals.
- Small induction furnace up to 3600°C.

Water model
- Laser methods applied to follow fluid flow and gas bubble flow behaviour in light-transparent models representing industrial processes.
- Pilot scale gas injections (in water).

Miscellaneous
- High temperature microscope for wettability studies; sessile drop method.
- 10-15 different vertical ‘versatile’ furnaces, temperatures up to 1600°C.
- Thermo Gravimetric Analyzer with mass spectrometer.
- Vacuum/inert gas facility for measurements of diffusion constants, up to 1200°C.
- Instruments for solubility measurements.

PHYSICAL METALLURGY

Metallography
- Specimen preparation and light optical laboratory.
  - Traditional specimen preparation equipment for cutting, embedding, grinding and mechanical polishing, Struers RotoPol-31 automatic grinding and polishing machine, Struers Lectropol-5 electropolisher, Struers Tenopol-5 for TEM thin foil preparation, 4 optical microscopes attached with digital cameras (Leica MeF4, Leitz MM6, Leitz Metallolplan, Zeiss Axiosvert 25), Matsuwa DVK-15 microhardness tester (0.5 – 10 kg), Leica VMHT MOT micro hardness tester (1g – 2000g, anno 2003).
  - X-ray diffraction Siemens D5000 X-ray diffractometer equipped with Euler cradle for texture measurements.
  - Furnace laboratory 5 salt bath furnaces (250°C-590°C), 5 oil bath furnaces (50°C-250°C), 9 fluid bed furnaces (0°C-600°C), 2 muffle furnaces (0°C-800°C, 0°C-1300°C), 2 air circulation furnaces (0°C-650°C), one with large chamber (Multitherm S250/65A, 450mm x 450mm x 600mm, anno 2003).

Mechanical testing
- MTS 810 universal testing machine (10 tons), MTS 880 universal testing machine (10 tons) equipped with 250°C furnace chamber and MTS Teststar control units, shear tester, bend tester, compression tools, formability tools, fatigue and fracture grips, high rate tensile grips, ordinary extensometers and clip gauges for room temperature testing, laser speckle analyser.

Metal forming
- 60 and 100 tons hydraulic presses, equal channel angular pressing tools, hydroforming tools, Marciniaform formability tester (used also in MTS 880), ASAME equipment for automatic 3-dimensional strain analysis and measurements. Hot torsion machine, two cold rolling mills.

Welding
- Small scale solidification laboratory
  - 3 resistor furnaces (max 1000°C), reometer, Podfa filter for analysing melt quality, Bridgeman furnace (ferro alloys), Seiko differential scanning calorimeter (-150°C – 600°C).
- Casting laboratory
  - ASEA 3830 Hz induction furnace (6.5 liters, max 1700°C), Balzer VSG10 3830Hz vacuum induction furnace (1-2 liters, max 2000°C), Induction melt spinner for rapid solidification (5cm²), Marco arc melt spinner for rapid solidification (100cm³).
- American Welding Society (SINTEF but used by Department of Materials Science and Engineering)
  - Hyperbaric welding equipment, ABB welding robot station, Smitweld TCS 1405 resistor weld simulator, 2 high frequency induction generators (6KW, 12KW), medium frequency generator (50kW), IRC (Instrumented Restrained Cracking) jig, Satoh jig for welding prestressed specimens, Ströhlein TCD (Thermal Conductivity Detection) instrument for hydrogen measurement, mercury based hydrogen analysis apparatus.

Wear testing
- Pin on disk -, pin on ring - and pin on plate machines, Struers Microwave abrasive testing machine, water jet erosion machine.

Pressing

Solar silicon
- Clean room class 10000, Crystalox DS 250 Bridgeman furnace for directional solidification of (solar cell) silicon, saw for cutting silicon ingots, Jandel four points probe for resistivity measurements, Leo Gieken instrument for measurement of lifetime of minority charge carriers, PVScan 6000 instrument for measurement of dislocation densities and detection of grain boundaries, GTSolar LBIC (Light Beam Induced Current) measuring device. GDMS (Glow discharge mass spectrometer).
**ELECTROCHEMISTRY**

**Electrochemical equipment:**
- Potentiostats, frequency analysers and sweep generators.
- Electrochemical quartz crystal microbalance and an electrochemical quartz crystal nanobalance.

**Surface characterisation:**
- Electrochemical STM/AFM microscopy for performing in situ combined electrochemical and surface studies.

**Adsorption measurements:**
- A volumetric PCT (Pressure Composition Temperature) equipment for measurements of hydrogen adsorption in hydride forming materials.

**Miscellaneous:**
- Preparative equipment, vacuum systems, glove boxes, test rigs.

**INORGANIC CHEMISTRY**

**Materials characterization:**
- Thermobalances equipped for
  - Vapour pressure measurements by boiling point and Knudsen effusion method for use up to 2200°C.
  - High temperature gravimetric analysis (max. 2200°C) in controlled atmosphere.
- Calorimeters
  - Calvet type reaction calorimeters (max. 1120°C).
  - Differential scanning calorimeter (Perkin-Elmer DSC-2) for use up to 727°C.
  - DTA/Reaction calorimeter (max 1200°C).
  - TGA/DTA/DSC for use up to 1600°C.
- Viscometers
  - Precision viscometers for determination of the viscosity of molten salts, metals and hydrocarbons at high temperatures and pressures.
- Equipment for the measurement of thermal conductivity and thermal diffusivity by the hot strip method of solids or liquids up to 700°C (R and D Carbon).
- Equipment for the measurement of thermal conductivity of bricks and powders up to 1200°C.
- Hitachi S-3400N variable pressure SEM equipped with INCA Energy EDS system and EBSD.
- Reichert-Jung MeF3A optical microscope for metal and mineralogical applications equipped with computerized image analysis system.
- Porosimeters
  - Carlo Erba 2000 WS, (pore radius: 0.004-7.5 mm).
  - Micromeritics TRISTAR 3000, (pore diameter: 3.5-2100 Å).
  - Rapoport test apparatus (R and D Carbon).
  - Rammability (R and D Carbon).
  - Air Permeability (R and D Carbon).
  - Specific Electrical Resistance (R and D Carbon).
  - Sodium resistance test equipment (carbon).
  - Abrasion tester.
  - Lloyd LR 100K Materials Testing Machine. Yield and strength tests up to 1000°C.
  - Equipment for mechanical characterisation of bending strength, E-modulus, fracture toughness and creep up to 1100°C under controlled atmosphere.
  - Equipment for mechanical 3-point bending of gels (100 g load cell).

**Spectroscopy**
- Bruker IFS 66v Fourier Transform Infrared Spectrometer (4500 - 100 cm⁻¹). IR microscope.
- Cary 5, UV-VIS-NIR Spectrometer (57000 - 333 cm⁻¹).

**X-ray diffraction equipment**
- Bruker D8 ADVANCE X-ray diffractometer
  - Cu Kα X-ray tube, variable divergence slit assembly.
  - Theta/theta base goniometer, automatic sample changer, rotating reflection sample stage.
  - Variable anticratter slit assembly, scintillation detector.
  - VANTEC-I D detector with large active area.
  - TC-Wide Range low/high temperature chamber, rotating ceramic sample stage.
- Siemens D5005 powder X-ray diffracto-meter, unit A:
  - primary monochromator (quartz)
  - Cu Kα X-ray tube, automatic anticratter slit, scintillation detector
- Siemens D5005 powder X-ray diffractometer, unit B.
  - secondary monochromator (graphite), automated anticratter and divergence slit, Göbel mirror system, high temp. system HTK 15, pos. sensitive and scintillation detector, grazing incidence attachment, sample changer 40 pos, capillary sample holder.
- Philips counter X-ray diffractometer.
  - Diffractogram analysis software with complete ICDD Powder Diffraction File.
- Expectron XDC 1000 precision Guinier camera.
- High temperature Guinier - Simon camera (Eurat Nonius Delft, FR 533).
- KEJ densitometer for Guinier film.

**Catalysis**
- Reactor for Ziegler-Natta polymerization with continuous gas flow measurements.
- Reactors for production of dimethyl dichlorosilane and trichlorosilane both with computerized on-line gas chromato graphs for continuous analysis. One of the reactors can be pressurized up to 4 bar.
- Thermal dilation measurements in controlled atmosphere up to 1450°C.
- LECO TC-436 Oxygen and Nitrogen Determinator.
- Micromeretics AccuPyc 1330 Pycnometer.

**Production of carbon materials**
- Pilot plant scale for mixing anode, cathode or ramming paste including sigma-mixer and vibration press.

**Production of ceramic materials**
- Spray pyrolysis unit for large scale production of ceramic powders.
- Spray dryer.
- Cold isostatic press (Flow Autoclave Systems).
- Uniaxial press.
- Tape Caster (Richard E. Mistler).

**Production of ceramic materials**
- Spray pyrolysis unit for large scale production of ceramic powders.
- Spray dryer.
- Cold isostatic press (Flow Autoclave Systems).
- Uniaxial press.
- Tape Caster (Richard E. Mistler).

**Production of carbon materials**
- Pilot plant scale for mixing anode, cathode or ramming paste including sigma-mixer and vibration press.
Guest Lecturers

Dr. Roderick Guthrie, McGill University, Montreal, Quebec, Canada, January 21, 2005. “Fluid flows in metallurgy; fried or foe”.

Dr. Rajan Ambat, Technical University of Denmark (DTU), Department of Manufacturing Engineering and Management Materials and Process Group, January 26, 2005. “Microstructural effects in corrosion of aluminium alloys”.


Dr. Arend de Groot, Energieonderzoek Centrum Nederland (ECN), The Netherlands, February 24, 2005. “Cost and drivers for building a hydrogen infrastructure in the Netherlands”.

Jason Nadler, Office National d’Etudes et Recherches Aérospatiales (ONERA), France, April 6, 2005. “Ultra fine scale cellular materials for aerospace applications”.


Dr. Paul Schaffer, University of Queensland, Australia, March 30, 2005. “Grain refiner fade in aluminium alloys”.

Professor David Wilkinson, McMaster University, Canada, April 13, 2005. “Tomographic studies of damage and fracture”.

Professor David Wilkinson, McMaster University, Canada, April 14, 2005. “Studies of formability in Al alloys”.

Oscar Paris, Max Planck Institute Postdam Germany, April 28, 2005. “Transformations of heirarchical biological structures to anorganic (carbon + ceramic) materials”.

Professor Thomas Tybell, Department of Electronics and Telecommunications, NTNU, Norway, May 4, 2005. “An overview of nanomaterials present and future at NTNU”.

Professor Derek Pletcher, Electrochemistry group, University of Southampton, United Kingdom, May 27, 2005. “Electrodes and electrocatalysis – present work at University of Southampton”.

Professor Achille De Battisti, University of Ferrara, Italy, June 7, 2005. “Dimensionally stable anodes for oxygen evolution”.

Professor Kazuo Nakajima, Tohoku University, Institute for Materials Research, Sendai, Japan, August 22, 2005. “Research and development of solar cell crystals for the first, second and third generations”.

Professor Dr. Jürgen Behm, Abteilung Oberflächenchemie und Katalyse, Universität Ulm, Germany, December 8, 2005. “Electrooxidation of C1 fuels under fuel cell relevant conditions – fundamental aspects”.

Associate Professor Rajan Ambat and Professor Per Møller, Danish Technical University, Lyngby, Denmark, April 14, 2005. “Real time on E-learning in the virtual classroom”.

Fredrik Haakonsen og Tore Jørgensen demonstrating Samurai sword (Katana).
Trine Øyås preparing for XRD analysis.

Fabian Nitsche operating an X-ray diffractometer.

Hilde L. Lein preparing samples for KRD measurements.
Staff

SCIENTIFIC STAFF

Professor, Ph.D. Lars Arnborg
Professor emeritus Jon Arne Bakken
Associate Professor, Dr.ing. Dagfinn Bratland
Associate Professor, Dr.ing. Borre Børresen, to August 31, 2005
Professor, Dr.ing. Mari-Ann Einarsrud
Professor emeritus, Dr.ing. Arne Wang Espelund
Professor, Dr.ing. Pietro Fossnes
Professor, Dr.ing. Tor Grande
Professor, Dr.ing. Øystein Grong
Professor emeritus, Dr.techn. Jan Lützow Holm
Professor, Dr.ing. Geir Martin Haarberg
Associate Professor, Dr.scient. Kjell Ove Kongshaug, from October 1, 2005
Professor, Dr.ing. Leiv Kolbeinsen
Associate Professor, Dr.scient. Jarle Hjelen
Professor, Dr.philos. Otto Lohne
Professor, Dr.ing. Knut Marthinsen
Professor emeritus, M.Sc.Eng. Ketil Motzfeldt
Professor, Ph.D. Erik Nes
Professor, Ph.D. Kemal Nisancioglu
Professor emeritus Sverre Olsen
Professor emeritus, Dr.techn. Jan Lützow Holm
Professor, Dr.techn. Hans Jorgen Roven
Professor emeritus, Dr.techn. Nils Ryum
Professor, Dr.philos Jan Ketil Solberg
Professor emeritus, Dr.ing. Åsmund Sterten
Professor, Dr.techn. Svein Sunde
Professor, Dr.ing. Merete Tangstad
Professor emeritus, Dr.techn. Jomar Thonstad
Professor emeritus Johan Kristian Tusset
Associate Professor, Dr.ing. Kjell Wiik
Professor, Dr.ing. Martin Ystenes
Professor, Ph.D. Lifeng Zhang, from October 13, 2005
Professor, Dr.techn. Terje Østvold
Professor, Dr.techn. Harald Arnlof Øye, to June 30, 2005
Professor emeritus, Dr.techn. Harald Arnljot Øye, from July 1, 2005
Adjunct Professor, Ph.D. Olaf Engler
Adjunct Associate Professor, Dr.ing. Øyvind Gustavsen, from September 1, 2005
Adjunct Professor, Dr.scient. Jarle Hjelen
Adjunct Professor, Dr.ing. Ola Jensrud
Adjunct Professor, Dr.techn. Stein Julsrud
Adjunct Professor, Dr.ing. Harald Justnes
Adjunct Professor, Dr.techn. Halvor Kvande, to July 2, 2005
Adjunct Professor, Dr.ing. Tor Lindstad
Adjunct Professor, Dr.ing. Knut Arne Paulsen
Adjunct Professor, Dr.techn. Oddvin Reiso
Adjunct Professor, Dr.ing. Christian Rosenkilde
Adjunct Professor, Dr.ing. Morten Sortie
Adjunct Professor, Dr.ing. Halvard Tveit
Adjunct Professor, Ph.D. Volodymyr Yartys

TECHNICAL STAFF

Engineer Jan Arve Baatnes
Engineer Terje Forsaa
Engineer Fritz Helgemo
Senior Engineer Eli Beate Jakobsen
Engineer Tore Jorgensen, to August 8, 2005
Senior Engineer Torild Krogstad, from March 1, 2005
Chief Engineer Elin Nilsen
Senior Engineer Tor Arild Nilsen
Senior Engineer Håvard Norum, to August 31, 2005
Engineer Kjell Rokke
Chief Engineer Morten Raanes
Engineer Odd Steinar Stromsli
Engineer May Grete Saatran
Senior Engineer Pål Ulseth
Engineer Gunn Torill Wikdahl, leave of absence
Chief Engineer Yingda Yu, from September 1, 2005
Engineer Trine Øyås

ADMINISTRATIVE STAFF

Head of Administration Trond Einar Hagen
Executive Officer Martha Bjerknes
Executive Officer Elsa Mari Florhaug
Executive Officer Unni Keiseraas
Higher Executive Officer Brit Wenche Meland
Executive Officer Hilde Martinsen Nordø
Secretary Ase Lill Salomonsen
Senior secretary Camilla Skjold Ødegard, from September 26 to November 11, 2005

RESEARCH SCIENTISTS

Ph.D. Stephane Dumoulin
Dr.scient. Jarle Hjelen (60%)
Dr.ing. Håvard Karolusse, from April 1 to June 30, 2005
Ph.D. Ana Maria Martinez (80%), from August 1, 2005
Ph.D. Yingda Yu, to August 31, 2005

GUEST PROFESSORS/RESEARCHERS

Professor, Ph.D. David Embury, to May 14, 2005
Dr. Jan Hives, from August 1 to September 30, 2005
Dr. Tsuyoshi Murakami, to August 2, 2005
Dr. Hasan Okuyucu, to March 18, 2005
Dr. Stanislaw Pietrzyk, from July 1 to September 30, 2005
Dr. Shuihua Tang, to September 5, 2005

POST DOCTORAL FELLOWS

Dr.ing. Randi Brateng, to August 14, 2005
Dr.ing. Jesper Friis
Dr.ing. Bjorn Holmedal
Ph.D. Zhihong Jia, from August 3, 2005
Dr.ing. Sten-Egil Johnsen, to May 31, 2005
Ph.D. Ingeborg Kaus, to October 31, 2005

ADMINISTRATIVE STAFF

Head of Administration Trond Einar Hagen
Executive Officer Martha Bjerknes
Executive Officer Elsa Mari Florhaug
Executive Officer Unni Keiseraas
Higher Executive Officer Brit Wenche Meland
Executive Officer Hilde Martinsen Nordø
Secretary Ase Lill Salomonsen
Senior secretary Camilla Skjold Ødegard, from September 26 to November 11, 2005

RESEARCH SCIENTISTS

Ph.D. Stephane Dumoulin
Dr.scient. Jarle Hjelen (60%)
Dr.ing. Håvard Karolusse, from April 1 to June 30, 2005
Ph.D. Ana Maria Martinez (80%), from August 1, 2005
Ph.D. Yingda Yu, to August 31, 2005

GUEST PROFESSORS/RESEARCHERS

Professor, Ph.D. David Embury, to May 14, 2005
Dr. Jan Hives, from August 1 to September 30, 2005
Dr. Tsuyoshi Murakami, to August 2, 2005
Dr. Hasan Okuyucu, to March 18, 2005
Dr. Stanislaw Pietrzyk, from July 1 to September 30, 2005
Dr. Shuihua Tang, to September 5, 2005

POST DOCTORAL FELLOWS

Dr.ing. Randi Brateng, to August 14, 2005
Dr.ing. Jesper Friis
Dr.ing. Bjorn Holmedal
Ph.D. Zhihong Jia, from August 3, 2005
Dr.ing. Sten-Egil Johnsen, to May 31, 2005
Ph.D. Ingeborg Kaus, to October 31, 2005
Dr.ing. Ole Edvard Kongstein
Dr.ing. Anne Kvithyld
Dr.ing. Hilde Lea Lein, from June 1, 2005
Ph.D. Manping Liu, from February 28, 2005
Ph.D. Raymond Longbottom, from August 29, 2005
Ph.D. Ana Maria Martinez, to June 11, 2005
Dr.ing. Øyvind Ryen, to August 14, 2005
Dr.ing. Gaute Stokkan (50%)
Ph.D. Yang Sun, to June 30, 2005
Ph.D. Mikhail Tsypkin
Dr.ing. Marianne Videm (50%) leave of absence
Ph.D. Guozhong Wang
Ph.D. Marisa Di Sabatino, from December 1, 2005
Ph.D. Paul Schaffer, from May 1, 2005
Ph.D. Frode Seland, from December 8, 2005
Dr.ing. Magnus Skinlo Thomassen, from August 22, 2005
Ph.D. Julian Tolchard, from August 23, 2005
Ph.D. Jens Christofer Werenskiold
Dr.ing. Kari Aarstad, from September 15, 2005

SCIENTIFIC ASSISTANTS

Øystein Andersen
Sjur Dalsbotten, from January 17 to August 31, 2005
Jan Martin Eriksen, to July 31, 2005
Anders Jernberg, to August 15, 2005
Leif Olav Jøsang, to January 12, 2005
Camilla Karlsen, from June 27 to November 29, 2005
Bård Knudsen, to January 12, 2005
Erin Kvalheim
Tone Lyngdal (50%) from January 11 to May 15, 2005
Håkon Nesbo, to May 31, 2005
Håvard Norum, from September 1, 2005
Sverre Selbach (50%) from January 11 to May 15, 2005
Dimitriy Slizovskiy, from September 26, 2005
Ruth Astrid Strøm, to November 13, 2005

DEPARTMENT SCHOLARSHIP HOLDERS

Ole-Kristian Eide
Sørin Isac (50%) from August 1, 2005
Tore Larsen
Tommy Mokkelbost
Sverre Magnus Selbach, from August 28, 2005
Cecilie Ødegård

EXTERNAL SCHOLARSHIP HOLDERS

Jorun Zahl Albertsen
Hans Bjerkås
Stein Trygve Briskeby
Marisa Di Sabatino, to October 30, 2005
Odd Einar Frosta
Nils Håvard Giskeidiegår
Brit Kathrine F. Graver
Harald Görner
Jana Hajasova
Håkon Hallem, to October 30, 2005
Raino Helenius
Mohamed Ibrahim
Jakub Kaczorowski
Martin Keppert
Rannveig Kvande
Sten Yngve Larsen
Ingrid Anne Levik
Aaron Marshall, to June 14, 2005
Johann Mastin
Axel Baumann Ofstad
Marian Palcut
Silje Rodahl
Birgit Ryningen
Jafaar Safarian-Dastjerdi
Kristian Sandengen
Frode Seland, to December 7, 2005
Maneesh C. Srivastava, from August 11, 2005
Gaute Svenningsen, to January 10, 2005
Przemyslaw Szczygiew
Øystein Sævik, to April 30, 2005
Magnus Skinlo Thomassen, to June 30, 2005
Michal Tkac
Kristin Vasshaug
Helge Weydahl
Dongju Zhao, from June 30, 2005

UNDERGRADUATE ASSISTANTS

Spring term 2005

Asbjørnsen, Ingvild
Binai-Faal, Navid
Bjørntes, Magne
Eiesland, Jon Wostryck
Eilertsen, Einar Andre
Evensen, Trond
Fagerbekk, Siri
Fahadi, Jalal
Gleditch, Morten
Gåserud, Espen Stødle
Hagen, Linda Jeanette
Hagen, Susanne Wilhelmsen
Hansen, Jørn
Haugmo, Ingvild Eide
Herland, Oddvar
Hessen, Erik
Høa, Endre Magnus
Haas, Olav-Erich
Jakobsen, Magnus Goslit
Jensen, Geir Trygve
STAFF 27

Johansen, Linda Renate
Jørgensen, Vegard
Kjos, Ole Sigmund
Larsen, Ernst Richard
Lied, Ole Kristian
Løken, Sondre
Marum, Henrik
Melnes, Silje
Nag, Silje
Okstad, Trine
Owe, Lars Erik
Seim, Stian
Skjeldestad, Aslak
Slevolden, Elisabeth
Stabell, Tone
Stangeland, Helga Wiig
Syre, Marie
Sæten, Christina
Tysse, Øyvind
Westermann, Ida
Østrem, Øyvind

UNDERGRADUATE ASSISTANTS

Fall term 2005

Asbjørnsen, Ingvild
Bomstad, Fredrik
Brataas, Ingvild Eiesvold
Børgund, Monica Andrea
Engesvold, Marion
Evensen, Trond
Fagerbekk, Siri Albertsen
Frydenberg, Tone
Gleditch, Morten
Gåserud, Espen Stådale
Hagen, Linda Jeanette
Haugmo, Ingvild Eide
Høva, Endre Magnus
Jensen, Geir Trøgve
Johansen, Linda Renate
Jøndahl, Mari
Jørgensen, Vegard
Kjos, Ole Sigmund
Larsen, Ernst Richard
Lied, Ole Kristian
Lorentsen, Bjørn Seland
Løken, Sondre
Nag, Silje
Owe, Lars Erik
Ramdal, Ingun
Slevolden, Elisabeth
Stabell, Tone
Stangeland, Helga Wiig
Sunde, Tor Olav Løveng
Tennøe, Andreas
Tjetland, Gørl
Westermann, Ida
Wåsjø, Johanna

EXCHANGE STUDENTS

Shawn Wilson
Christina Meskers
Arjan Ciftja

SUMMER STUDENTS

Stine Hals
Brynjjar Hoff Helgetun
Ole Sigmund Kjos
Hilde Stangeland
Marte Bjørnsdotter Ludvigsen

APPRENTICE

Mari Bakken

DEPARTMENT BOARD

January 2005 - August 2005
Lars Arnberg (chair)
Mari-Ann Einarsrud
Tor Grande
Geir Martin Haarberg
Eirik Rabbe Johnsen
Leiv Kolbeinsen
Tone Lyngdal
Knut Martinsen
Kemal Nisancioglu
Morten Raanes
Aud N. Wærnes

SUBSTITUTES:

Mari-Ann Einarsrud
Trond Einar Hagen
Odd Sture Hopperstad
Brit Wenche Meland
Kemal Nisancioglu
Ida Westermann
Camilla Wollan
Aud Wærnes (chair)

ADVISORY BOARD

August 2005 - December 2005

Lars Arnberg
Per Anders Eidem
Mari-Ann Einarsrud
Trond Einar Hagen
Odd Sture Hopperstad
Brit Wenche Meland
Kemal Nisancioglu
Ida Westermann
Camilla Wollan
Aud Wærnes (chair)
Graduate Studies

– Dr.ing./Ph.D. Degrees

During 2005, 67 Dr.ing./Ph.D. students have worked at Department of Materials Science and Engineering. 14 students have been awarded the degree Dr.ing./Ph.D.:

**Di Sabatino, Marisa:**

“Fluidity of aluminium foundry alloys”.
September 2005.

**Major Subject:** Physical metallurgy.

**Dr. lecture:** “Modification of the aluminium-silicon eutectic”.

**Thesis Advisor:** Professor, Ph.D. Lars Amberg.

**Co-supervisor:** Adjunct Professor, Ph.D. Morten Lange, Department of Engineering Design and Materials, NTNU.

**Examination committee:**
Dr.ing. Steinar Benum, ELKEM Aluminium ANS, Mosjøen, Norway.
Professor, Dr.ing. Øystein Grong, Department of Materials Science and Engineering, NTNU (chair).

**Hallem, Håkon:**

“Precipitation behaviour and recrystallisation resistance in aluminium alloys with additions of hafnium, scandium and zirconium”.
September 2005.

**Major Subject:** Physical metallurgy.

**Dr. lecture:** “Extrusion of aluminium alloys: nature and origin of microstructural spatial heterogeneities”.

**Thesis Advisor:** Professor, Dr.ing. Knut Marthinsen.

**Co-supervisor:** Research Scientist, Dr.ing. Børge Forbord, SINTEF Materials and Chemistry, Trondheim, Norway.

**Examination committee:**
Professor, Ph.D. Yves Brechet, Institut National Polytechnique de Grenoble, LTPCM, BP75, Saint Martin de Heres, France.
Manager, Ph.D. Hans-Erik Ekström, Mechanical properties & Microstructure modelling, Sapa Technology, Finspong, Sweden.
Professor, Ph.D. Erik Nes, Department of Materials Science and Engineering, NTNU (chair).

**Larsen, Tore:**

“Sand stabilization with mineral precipitation”.
October 2005.

**Major Subject:** Inorganic chemistry.

**Dr. lecture:** “Mechanisms and kinetics for nucleation and growth of crystalline particles from solution”.

**Thesis Advisor:** Professor, Dr.techn. Terje Østvold.

**Co-supervisor:** Adjunct Associate Professor Dr.ing. Øyvind Tveter Gustavsen.

**Examination committee:**
Senior Research Scientist, Ph.D. Peter Vang Hendriksen, Risø National Laboratory, Materials Research Department, Roskilde, Denmark.
Research Manager, Dr.scient. Rune Bredesen, SINTEF Materials and Chemistry, Oslo, Norway.
Professor, Ph.D. Kemal Nisancioglu, Department of Materials Science and Engineering, NTNU (chair).

**Lein, Hilde Lea:**

“Mechanical properties and phase stability of oxygen permeable membranes $\text{La}_{0.5}\text{Sr}_{0.5}\text{Fe}_{1.4}\text{Co}_{0.6}O_3$”.
February 2005.

**Major Subject:** Inorganic chemistry.

**Dr. lecture:** “Proton conducting oxides – current status on hydrogen separating membranes and fuel cells”.

**Thesis Advisor:** Professor, Dr.ing. Tor Grande.

**Co-supervisor:** Associate Professor, Dr.ing. Kjell Wiik.

**Examination committee:**
Senior Research Scientist, Ph.D. Peter Vang Hendriksen, Risø National Laboratory, Materials Research Department, Roskilde, Denmark.
Research Manager, Dr.scient. Rune Bredesen, SINTEF Materials and Chemistry, Oslo, Norway.
Professor, Ph.D. Kemal Nisancioglu, Department of Materials Science and Engineering, NTNU (chair).

Major Subject: Inorganic chemistry.
Dr. lecture: “Application of coke in the metallurgical industry. Behaviour, quality criteria, influence on final products and market development”.
Thesis Advisor: Professor, Dr.techn. Harald A. Øye.
Examination committee: Professor John W. Patrick, School of Chemical, Environmental and Mining Engineering, Nottingham, United Kingdom.
Dr. Jan Olaf Roszinski, ELKEM Materials, Kristiansand, Norway.
Professor, Dr.ing. Trygve Foosnæs, Department of Materials Science and Engineering, NTNU (chair).


Major Subject: Electrochemistry.
Dr. lecture: “Electrical double layers – structures, properties and importance”.
Thesis Advisor: Professor, Dr.techn. Svein Sunde.
Co-supervisor: Professor emeritus Reidar Tunold.
Examination committee: Professor, Dr. Achille De Battisti, Departimento di Chimica, University of Ferrara, Ferrara, Italy.
Professor, Dr. Göran Lindbergh, Chemical Engineering and Technology, School of Chemical Science and Engineering, Stockholm, Sweden.
Professor, Dr.ing. Geir Martin Haarberg, Department of Materials Science and Engineering, NTNU (chair).


Major Subject: Electrochemistry.
Dr. lecture: “Conversion of hydrogen to mechanical and electric power – technological status and challenges”.
Thesis Advisor: Associate Professor, Dr.ing. Rolf Jarle Aaberg, IFE/Statkraft, Norway.
Co-supervisor: Research Scientist Ronny Glöcker, IFE, Kjeller, Norway.
Examination committee: Dr. Arend de Groot, Energy Research Centre of the Netherlands, Petten, The Netherlands.
Siv.ing. Kjetil Fjalestad, Norsk Hydro ASA, Porsgrunn, Norway.
Professor emeritus Reidar Tunold, Department of Materials Science and Engineering, NTNU (chair).


Major Subject: Electrochemistry.
Dr. lecture: “Biofuels for fuel cells – fundamental and technological advantages and challenges”.
Thesis Advisor: Professor, Ph.D. Kemal Nisancioglu.
Co-supervisor: Professor emeritus Reidar Tunold.
Examination committee: Professor, Ph.D. David A. Harrington, Chemistry Department, University of Victoria BC, Canada.
Associate Professor, Dr. Elvind Skou, Department of Chemistry, University of Southern Denmark, Odense, Denmark.
Professor, Dr.techn. Svein Sunde, Department of Materials Science and Engineering, NTNU (chair).


Major Subject: Electrochemistry.
Dr. lecture: “Microprobe techniques in corrosion measurement”.
Thesis Advisor: Professor, Ph.D. Kemal Nisancioglu.
Co-supervisor: Senior Engineer, Dr.ing. Jan Halvor Nordlien, Hydros Forskningsenter, Karmøy, Norway.
Examination committee: Associate Professor, Ph.D. Rajan Ambat, Technical University of Denmark, Lyngby, Denmark.
Chief Engineer, Dr.ing. Håkon Leth-Olsen, Norsk Hydro ASA, Porsgrunn, Norway.
Professor, Dr.ing. Roy Johnsen, Department of Engineering Design and Materials, NTNU (chair).
<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
<th>Subject</th>
<th>Major Subject</th>
<th>Dr. lecture</th>
<th>Thesis Advisor</th>
<th>Co-supervisor</th>
<th>Examination Committee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sævik, Øystein</td>
<td>“Effect of trace element lead on the electrochemistry and corrosion of aluminium alloys”</td>
<td>Electrochemistry</td>
<td>Electrochemistry</td>
<td>“Underpotential deposition: phenomenon, mechanism and significance to electrochemistry and corrosion”</td>
<td>Professor, Ph.D. Kemal Nisancioglu.</td>
<td>Senior Engineer Jan Halvor Nordlien, Hydro Aluminium, Håvik, Norway.</td>
<td>Chief Scientific Officer, Ph.D. Geoff Scamans, Innoval Technology, Beaumont Close, Banbury, Oxon, United Kingdom. Research Scientist, Ph.D. Iris De Graeve, Department of Metallurgy, Electrochemistry and Materials Science, Vrije Universiteit Brussel, Belgium. Associate Professor, Dr.ing. Kjell Wiik, Department of Materials Science and Engineering, NTNU (chair).</td>
</tr>
<tr>
<td>Søiland, Anne-Karin</td>
<td>“Silicon for solar cells”</td>
<td>Extractive metallurgy</td>
<td>Extractive metallurgy</td>
<td>“Basic problems and technological challenges of CVD polysilicon production”</td>
<td>Professor, Ph.D. Bo Bjørkman, Luleå University of Technology, Sweden.</td>
<td>Professor emeritus Johan Kr. Tuset.</td>
<td>Senior Research Scientist, Dr. techn. Christian J. Simensen, SINTEF Materials and Chemistry, Oslo, Norway. Professor, Dr.ing. Merete Tangstad, Department of Materials Science and Engineering, NTNU (chair).</td>
</tr>
<tr>
<td>Thomassen, Magnus Skinlo</td>
<td>“Hydrogen-chlorine fuel cell for production of hydrochloric acid and electric power”</td>
<td>Electrochemistry</td>
<td>Electrochemistry</td>
<td>“Supercapacitors - principles, properties and applications”</td>
<td>Professor, Dr. Derek Pletcher, Electrochemistry &amp; Surface Science, School of Chemistry, University of Southampton, United Kingdom.</td>
<td>Professor, Dr. Elisabet Ahlberg, Department of Chemistry, Göteborg University, Sweden.</td>
<td>Professor, Dr.ing. Mari-Ann Einarsrud, Department of Materials Science and Engineering, NTNU (chair).</td>
</tr>
<tr>
<td>Vikan, Hedda Vestøl</td>
<td>“Rheology and reactivity of cementitious binders with plasticizers”</td>
<td>Inorganic chemistry</td>
<td>Inorganic chemistry</td>
<td>“Drying shrinkage of concrete – mechanism, consequences and countermeasures”</td>
<td>Adjunct Professor, Dr.ing. Harald Justnes.</td>
<td>Senior Research Scientist Tør Arne Hammer, SINTEF Bygg og miljøteknikk, Norway.</td>
<td>Professor Carmel Jolicoeur, Department of Chemistry, Faculty of Sciences, Université de Sherbrooke, Sherbrooke, Québec, Canada. Construction Manager Dr.ing. Kåre Reknes, Sika Norge AS, Skytta, Norway. Professor, Dr.ing. Mari-Ann Einarsrud, Department of Materials Science and Engineering, NTNU (chair).</td>
</tr>
<tr>
<td>Watterud, Geir</td>
<td>“Determination of oxygen transport coefficients in perovskites and perovskite related materials with mixed conductivity”</td>
<td>Inorganic chemistry</td>
<td>Inorganic chemistry</td>
<td>“Proton conductors for intermediate temperatures. Materials, mechanisms and applications”</td>
<td>Associate Professor, Dr.ing. Kjell Wiik.</td>
<td>Adjunct Professor, Dr.techn. Stein Julsrud.</td>
<td>Senior Scientist, Ph.D. Finn Willy Poulsen, Materials Research Department, Risø National Laboratory, Roskilde, Denmark. Research Manager, Dr.ing. Siv Aasland, STATOIL, Trondheim, Norway. Professor, Dr.ing. Mari-Ann Einarsrud, Department of Materials Science and Engineering, NTNU (chair).</td>
</tr>
</tbody>
</table>
### The following Ph.D. projects are in progress:

<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
<th>Thesis advisor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Albertsen, Jorun Zahl</td>
<td>Experimental and theoretical investigations of metal dusting corrosion in plant exposed nickel-based alloys.</td>
<td>Grong, Øystein</td>
</tr>
<tr>
<td>Bjørkaas, Hans</td>
<td>In-situ deformation of AlMgSi-alloys, experiments, state of the art equipment and theoretical modelling of plastic flow.</td>
<td>Roven, Hans Jørgen</td>
</tr>
<tr>
<td>Briskeby, Stein Trygve</td>
<td>Electro catalysts of noble metals supported on carbon nanofibres.</td>
<td>Sunde, Svein</td>
</tr>
<tr>
<td>Dahl, Paul Inge</td>
<td>Synthesis and characterization of oxygen and hydrogen conducting materials.</td>
<td>Einarsrud, Mari-Ann</td>
</tr>
<tr>
<td>Dalaker, Halvor</td>
<td>Thermodynamics of solar cell silicon in the high temperature area.</td>
<td>Tangstad, Merete</td>
</tr>
<tr>
<td>Eide, Ole-Kristian</td>
<td>IR and NMR spectroscopy of catalyst for olefin polymerization.</td>
<td>Ystenes, Martin</td>
</tr>
<tr>
<td>Eidem, Per Anders</td>
<td>Electrical conductivity of coke beds.</td>
<td>Tangstad, Merete</td>
</tr>
<tr>
<td>Erlien, Tomas Laugsand</td>
<td>Cold bonding mechanisms in aluminium alloys.</td>
<td>Grong, Øystein</td>
</tr>
<tr>
<td>Fjeldberg, Egil</td>
<td>Modelling and simulation of nano- and microstructure in Al-alloys.</td>
<td>Marthinsen, Knut</td>
</tr>
<tr>
<td>Frosta, Odd Einar</td>
<td>Modeling of baked anodes.</td>
<td>Foosnæs, Trygve</td>
</tr>
<tr>
<td>Giskeødegård, Nils Håvard</td>
<td>Adhesion of organic functional groups on aluminium.</td>
<td>Nisancioglu, Kemal</td>
</tr>
<tr>
<td>Graver, Brit Kathrine F.</td>
<td>Modification of properties of aluminium alloys by surface segregation of nanoscale trace element particles.</td>
<td>Nisancioglu, Kemal</td>
</tr>
<tr>
<td>Görner, Harald</td>
<td>Development of an AlF₃ active filter for Al.</td>
<td>Zhang, Lifeng</td>
</tr>
<tr>
<td>Hajasova, Jana</td>
<td>Electrochemical behaviour of dissolved impurity species of sulphur and phosphorus in molten salts.</td>
<td>Haarberg, Geir Martin</td>
</tr>
<tr>
<td>Helenius, Raimo</td>
<td>High pressure die casting of light metals.</td>
<td>Lohne, Otto</td>
</tr>
<tr>
<td>Haakonsen, Fredrik</td>
<td>Optimizing of strømhard austenitic manganese steel.</td>
<td>Solberg, Jan Ketil</td>
</tr>
<tr>
<td>Íbrahiem, Mohamed</td>
<td>Coatings in carbon cathodes.</td>
<td>Foosnæs, Trygve</td>
</tr>
<tr>
<td>Ísac, Sorin</td>
<td>Metal powder project - “Metal printing process”.</td>
<td>Arnberg, Lars</td>
</tr>
<tr>
<td>Jensen, Morten Sundheim</td>
<td>Chemical degradation, wetting and electrochemical properties of polycrystalline TIB₂ inert cathodes.</td>
<td>Grande, Tor</td>
</tr>
<tr>
<td>Johnsen, Kim Andre</td>
<td>Co-production of electrical power and hydrogen from natural gas – development of CO₂ adsorbent and reactor design for integrated reforming and CO₂ capture.</td>
<td>Kolbeinsen, Leiv</td>
</tr>
<tr>
<td>Jonasson, Lina M.</td>
<td>Cathode structure and cathode wear in aluminium electrolysis cells.</td>
<td>Foosnæs, Trygve</td>
</tr>
<tr>
<td>Kaczorowski, Jakub</td>
<td>The boudouard reaction in the manganese production progress, catalyzed by alkali components.</td>
<td>Lindstad, Tor</td>
</tr>
<tr>
<td>Keppert, Martin</td>
<td>Electrochemical behaviour of phosphorus species in fluoride melts.</td>
<td>Haarberg, Geir Martin</td>
</tr>
<tr>
<td>Kvande, Rannveig</td>
<td>Casting of silicon for use in solar cells.</td>
<td>Arnberg, Lars</td>
</tr>
<tr>
<td>Larsen, Magnus Hurlen</td>
<td>Effect of composition and thermomechanical processing on the intergranular corrosion of AA6000 aluminium alloys.</td>
<td>Nisancioglu, Kemal</td>
</tr>
<tr>
<td>Larsen, Sten Yngve</td>
<td>Novel carbon materials in electrometallurgical applications.</td>
<td>Foosnæs, Trygve</td>
</tr>
<tr>
<td>Name</td>
<td>Title</td>
<td>Advisor(s)</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>----------------------------------------------------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>Lervik, Ingrid Anne</td>
<td>Electrocatalyst for PEM water electrolysis.</td>
<td>Sunde, Svein</td>
</tr>
<tr>
<td>Lilleby, Anders Sunde</td>
<td>Mathematical modelling of material flow during extrusion and joining of aluminium based on the HYMEN bonding method.</td>
<td>Grong, Øystein</td>
</tr>
<tr>
<td>Mastin, Johann</td>
<td>Ferroelastic oxide materials.</td>
<td>Einarsrud, Mari-Ann</td>
</tr>
<tr>
<td>Mjøs, Øyvind</td>
<td>Directional solidification of multicrystalline silicon for solar cells.</td>
<td>Arnberg, Lars</td>
</tr>
<tr>
<td>Mokkelbost, Tommy</td>
<td>Synthesis and characterization of ionic conducting CeO$_2$- and LaNbO$_4$-based materials.</td>
<td>Einarsrud, Mari-Ann</td>
</tr>
<tr>
<td>Myrvågnes, Viktoria A. K.</td>
<td>Structure and behaviour of fossil reduction materials in the silicon- and ferrosilicon process.</td>
<td>Lindstad, Tor</td>
</tr>
<tr>
<td>Nordstrand, Erlend Fjøsne</td>
<td>Effects of non-metallic inclusions on the transformation behaviour of steel.</td>
<td>Grong, Øystein</td>
</tr>
<tr>
<td>Øfstad, Axel Baumann</td>
<td>Increasing the lifetime of PEM fuel cells - a fundamental study of degradation mechanisms.</td>
<td>Sunde, Svein</td>
</tr>
<tr>
<td>Palcut, Marian</td>
<td>Cation diffusion in ABO$_3$ perovskite oxides.</td>
<td>Grande, Tor</td>
</tr>
<tr>
<td>Paulsen, Ove Bjørn</td>
<td>Sealing of high temperature membrane reactors.</td>
<td>Grande, Tor</td>
</tr>
<tr>
<td>Rodahl, Silje</td>
<td>Chromate-free pre-treatment of aluminium for organic coating.</td>
<td>Nisancioglu, Kemal</td>
</tr>
<tr>
<td>Rudberg, Espen Andre</td>
<td>Oxygen and hydrogen exchange on functional oxide membranes.</td>
<td>Nisancioglu, Kemal</td>
</tr>
<tr>
<td>Øyningen, Birgit</td>
<td>Characterisation of solar cell - silicon.</td>
<td>Lohne, Otto</td>
</tr>
<tr>
<td>Rørvik, Per Martin</td>
<td>Ceramic nanoparticles and nanostructures by chemical methods.</td>
<td>Einarsrud, Mari-Ann</td>
</tr>
<tr>
<td>Safarian-Dastjerdi, Jafar</td>
<td>Kinetics and mechanisms of reduction of MnO containing silicate slags by selected forms of carbonaceous materials (slag-carbon reactivity).</td>
<td>Kolbeinsen, Leiv</td>
</tr>
<tr>
<td>Sandengen, Kristian</td>
<td>Prediction of scale formation in wet gas condensate pipelines.</td>
<td>Østvold, Terje</td>
</tr>
<tr>
<td>Sandnes, Espen</td>
<td>The anode process on carbon in chloride melts.</td>
<td>Haarberg, Geir Martin</td>
</tr>
<tr>
<td>Selbach, Sverre Magnus</td>
<td>Size and strain effects in ferroelectric and piezoelectric materials.</td>
<td>Grande, Tor</td>
</tr>
<tr>
<td>Srivistava, Maneesh C.</td>
<td>High pressure die casting of aluminium and magnesium alloys.</td>
<td>Lohne, Otto</td>
</tr>
<tr>
<td>Szczygiel, Przemyslaw</td>
<td>ECAP recycled Al alloys – experimental characterization of properties and microstructure.</td>
<td>Roven, Hans Jørgen</td>
</tr>
<tr>
<td>Tkac, Michal</td>
<td>Porosity development in composite carbon materials during heat treatment.</td>
<td>Foosnæs, Trygve</td>
</tr>
<tr>
<td>Vasshaug, Kristin</td>
<td>Electrochemical wear of carbon materials in fluoride melts.</td>
<td>Haarberg, Geir Martin</td>
</tr>
<tr>
<td>Westermoen, Andreas</td>
<td>Plasma reactor modelling.</td>
<td>Tangstad, Merete</td>
</tr>
<tr>
<td>Weydahl, Helge</td>
<td>Dynamic behaviour of fuel cell systems.</td>
<td>Sunde, Svein</td>
</tr>
<tr>
<td>Zhao, Dongju</td>
<td>Processing, properties and performance in use of direct reduced iron pellets containing added material to control steel structure.</td>
<td>Kolbeinsen, Leiv</td>
</tr>
<tr>
<td>Ødegård, Cecilie</td>
<td>Conversion of silicon tetrachloride to trichlorsilane.</td>
<td>Foosnæs, Trygve</td>
</tr>
<tr>
<td>Åkre, Torjus</td>
<td>Depolarised anodes for electrowinning of cobalt from chloride solutions.</td>
<td>Haarberg, Geir Martin</td>
</tr>
</tbody>
</table>
## Ph.D. projects, co-supervised in other departments:

<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
<th>Thesis advisors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chmelar, Juraj</td>
<td>Size reduction and specification of granular petrol coke with respect to chemical and physical properties.</td>
<td>Sandvik, Knut Lyng NTNU, Department of Geology and Mineral Resources (NTNU)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Foosnæs, Trygve</td>
</tr>
<tr>
<td>Fjeldbo, Snorre Kjørstad</td>
<td>Experimental studies and simulation of structure evolution and formability along complex loading paths.</td>
<td>Støren, Sigurd (NTNU, Department of Engineering Design and Materials)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Roven, Hans Jørgen</td>
</tr>
<tr>
<td>Kofina, Katerina</td>
<td>Phosphorus recovery from wastewater. Nucleation and crystal growth of struvite in aqueous media.</td>
<td>Koutsoukos, Petros G. (University of Patras, Department of Chemical Engineering, Patras, Greece)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Østvold, Terje</td>
</tr>
<tr>
<td>Lioliou, Marianna</td>
<td>Experimental study and theoretical modeling of soil consolidation, for protection from corrosion, using inorganic salts precipitation.</td>
<td>Payatakes, Alkiviades (University of Patras, Department of Chemical Engineering, Patras, Greece)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Østvold, Terje</td>
</tr>
<tr>
<td>Moen, Kari</td>
<td>Advanced characterization of minerals.</td>
<td>Malvik, Terje (NTNU, Department of Geology and Mineral Resources Engineering)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hjelen, Jarle</td>
</tr>
<tr>
<td>Søndenå, Rune</td>
<td>Dynamic structure energetics and phase stability of 1D, 2D and 3D network-forming compounds and melts.</td>
<td>Stølen, Svein (University of Oslo, Department of Chemistry)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Grande, Tor</td>
</tr>
</tbody>
</table>

First year students working in the general chemistry laboratory.
Visit by a local high school.

Tommy Mokkelbost studying ceramic materials in the SEM laboratory.

Zhaohui Wang and Eli Jakobsen measuring thermo gravimetry.
## Course program

Descriptions of the courses offered at the Department are included in the University Course Catalogue that can be obtained from Student and Academic Section, NTNU. The present survey lists the courses given by our scientific staff.

<table>
<thead>
<tr>
<th>Course no.</th>
<th>Semester:</th>
<th>Title</th>
<th>Credits in parenthesis</th>
<th>Lectures and exercise coordinators</th>
<th>Passed/Started</th>
</tr>
</thead>
<tbody>
<tr>
<td>TMT4105</td>
<td>S</td>
<td>Gen. Chem., (7.5)</td>
<td></td>
<td>M. Ystenes</td>
<td>151/219</td>
</tr>
<tr>
<td>TMT4110</td>
<td>S</td>
<td>Gen. Cemi. (7.5)</td>
<td></td>
<td>D. Bratland</td>
<td>110/139</td>
</tr>
<tr>
<td>TMT4120</td>
<td>S</td>
<td>Gen. Chem., 2 (7.5)</td>
<td></td>
<td>T. Foosnæs</td>
<td>72/73</td>
</tr>
<tr>
<td>TMT4140</td>
<td>S</td>
<td>Appl. Thermodyn., (7.5)</td>
<td></td>
<td>T. Østvold, T. Haug-Warberg</td>
<td>20/42</td>
</tr>
<tr>
<td>TMT4150</td>
<td>S</td>
<td>Refractories, (7.5)</td>
<td></td>
<td>K. Wiik</td>
<td>9/9</td>
</tr>
<tr>
<td>TMT4160</td>
<td>S</td>
<td>Hightemp. Chem., (7.5)</td>
<td></td>
<td>D. Bratland</td>
<td>10/10</td>
</tr>
<tr>
<td>TMT4175</td>
<td>S</td>
<td>Materials Technology 2 (7.5)</td>
<td></td>
<td>Ø. Grong, K. Marthinsen, O. Lohne</td>
<td>27/27</td>
</tr>
<tr>
<td>TMT4190</td>
<td>S</td>
<td>Applied Materials Technology (7.5)</td>
<td></td>
<td>O. Lohne, K. H. Holthe</td>
<td>22/24</td>
</tr>
<tr>
<td>TMT4206</td>
<td>S</td>
<td>Fluid and Heat Transfer, Intr. Course</td>
<td></td>
<td>T. Lindstad, R. Kristoffersen, H. F. Svendsen</td>
<td>14/15</td>
</tr>
<tr>
<td>TMT4210</td>
<td>S</td>
<td>Material and Process Modelling (7.5)</td>
<td></td>
<td>K. Marthinsen</td>
<td>35/35</td>
</tr>
<tr>
<td>TMT4215</td>
<td>S</td>
<td>Casting (7.5)</td>
<td></td>
<td>L. Arnberg</td>
<td>41/43</td>
</tr>
<tr>
<td>TMT4225</td>
<td>S</td>
<td>Mech.Prop. of Eng. Mat. 2 (7.5)</td>
<td></td>
<td>E. Nes</td>
<td>12/12</td>
</tr>
<tr>
<td>TMT4235</td>
<td>S</td>
<td>Refin. and Recycl. of Met. (7.5)</td>
<td></td>
<td>M. Syvertsen</td>
<td>11/11</td>
</tr>
<tr>
<td>TMT4240</td>
<td>S</td>
<td>Microstruc. and Prop. of Mat. (7.5)</td>
<td></td>
<td>J. K. Solberg</td>
<td>21/22</td>
</tr>
<tr>
<td>TMT4245</td>
<td>S</td>
<td>Functional Materials (7.5)</td>
<td></td>
<td>M-A. Einarsrud</td>
<td>2/2</td>
</tr>
<tr>
<td>TMT4250</td>
<td>S</td>
<td>Elect.chem., basis cour. (7.5)</td>
<td></td>
<td>G. M. Haarberg</td>
<td>24/27</td>
</tr>
<tr>
<td>TMT4260</td>
<td>S</td>
<td>Phase Trans. in Metals (7.5)</td>
<td></td>
<td>K. Marthinsen</td>
<td>2/2</td>
</tr>
<tr>
<td>TMT4280</td>
<td>S</td>
<td>Extractive metallurgy (7.5)</td>
<td></td>
<td>L. Kolbeinsen</td>
<td>1/1</td>
</tr>
<tr>
<td>TMT4285</td>
<td>S</td>
<td>Hydrogen Techn., Fuel/Solar Cells (7.5)</td>
<td></td>
<td>S. Sunde</td>
<td>44/46</td>
</tr>
<tr>
<td>TMT4290</td>
<td>S</td>
<td>Mater. and Surf. Chem. (7.5)</td>
<td></td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>TMT4305</td>
<td>S</td>
<td>Electrometallurgy (7.5)</td>
<td></td>
<td>H. Tveit, M. Tangstad</td>
<td>-</td>
</tr>
<tr>
<td>TMT4310</td>
<td>S</td>
<td>Electrocat. and Ener. Techn. (7.5)</td>
<td></td>
<td>R. Tunold</td>
<td>4/4</td>
</tr>
<tr>
<td>TMT4315</td>
<td>S</td>
<td>Electrochem. Eng., (7.5)</td>
<td></td>
<td>K. Nisancioglu</td>
<td>8/8</td>
</tr>
<tr>
<td>TMT4850</td>
<td>S</td>
<td>Experts in team, (7.5)</td>
<td></td>
<td>J. K. Solberg</td>
<td>25/25</td>
</tr>
<tr>
<td>TMT4851</td>
<td>S</td>
<td>Experts in team, (7.5)</td>
<td></td>
<td>T. Foosnæs</td>
<td>26/26</td>
</tr>
<tr>
<td>TMT4100</td>
<td>A</td>
<td>Gen. Chem., (7.5)</td>
<td></td>
<td>M. Ystenes</td>
<td>222/304</td>
</tr>
<tr>
<td>TMT4115</td>
<td>A</td>
<td>Gen. Chem., 1 (7.5)</td>
<td></td>
<td>T. Foosnæs</td>
<td>64/66</td>
</tr>
<tr>
<td>TMT4145</td>
<td>A</td>
<td>Ceramic Engin. (7.5)</td>
<td></td>
<td>M-A. Einarsrud</td>
<td>12/13</td>
</tr>
<tr>
<td>Course Code</td>
<td>Level</td>
<td>Title</td>
<td>Credits</td>
<td>Coordinators</td>
<td></td>
</tr>
<tr>
<td>-------------</td>
<td>-------</td>
<td>-------</td>
<td>---------</td>
<td>--------------</td>
<td></td>
</tr>
<tr>
<td>TMT4155</td>
<td>A</td>
<td>Heterog. Equilib. (7.5)</td>
<td>T. Grande</td>
<td>34/34</td>
<td></td>
</tr>
<tr>
<td>TMT4170</td>
<td>A</td>
<td>Mater. Techn. 1 (7.5)</td>
<td>H. J. Roven, N. Ryum, L. Kolbeinsen</td>
<td>33/33</td>
<td></td>
</tr>
<tr>
<td>TMT4185</td>
<td>A</td>
<td>Mater. Science and Eng. (7.5)</td>
<td>B. Børresen</td>
<td>52/52</td>
<td></td>
</tr>
<tr>
<td>TMT4200</td>
<td>A</td>
<td>Heat and Mass Trans. (7.5)</td>
<td>T. Lindstad</td>
<td>1/1</td>
<td></td>
</tr>
<tr>
<td>TMT4275</td>
<td>A</td>
<td>Thermodyn. and Phasedia. (7.5)</td>
<td>L. Kolbeinsen</td>
<td>23/23</td>
<td></td>
</tr>
<tr>
<td>TMT4295</td>
<td>A</td>
<td>Electro. Proc. (7.5)</td>
<td>G. M. Haarberg</td>
<td>17/19</td>
<td></td>
</tr>
<tr>
<td>TMT4300</td>
<td>A</td>
<td>Light and Electr. Micro. (7.5)</td>
<td>J. K. Solberg, J. Hjelen</td>
<td>26/28</td>
<td></td>
</tr>
<tr>
<td>TMT4710</td>
<td>A</td>
<td>Corr. and surfacetechn., special. (22.5)</td>
<td>K. Nisancioglu</td>
<td>7/7</td>
<td></td>
</tr>
<tr>
<td>TMT4720</td>
<td>A</td>
<td>Ceramic Eng. and Func. Mat., special. (22.5)</td>
<td>K. Wiik</td>
<td>2/2</td>
<td></td>
</tr>
<tr>
<td>TMT4730</td>
<td>A</td>
<td>Proc. Metall. and Electrolysis, special. (22.5)</td>
<td>T. Foosnæs, L. Kolbeinsen, G. M. Haarberg</td>
<td>7/8</td>
<td></td>
</tr>
<tr>
<td>TMT4740</td>
<td>A</td>
<td>Energy and Mater., special. (22.5)</td>
<td>B. Børresen</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>TMT4750</td>
<td>A</td>
<td>Mat. Development and Specialization, (22.5)</td>
<td>H. J. Roven</td>
<td>5/5</td>
<td></td>
</tr>
<tr>
<td>MT8100</td>
<td>A-04/S-05</td>
<td>Transport Phenomena (12.0)</td>
<td>K. Nisancioglu</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>MT8102</td>
<td>A-04/S-05</td>
<td>Corrosion and surface technology, (7.5)</td>
<td>K. Nisancioglu</td>
<td>5/5</td>
<td></td>
</tr>
<tr>
<td>MT8103</td>
<td>A-04/S-05</td>
<td>Semiconductor electrochemistry, (10.0)</td>
<td>Svein Sunde</td>
<td>2/2</td>
<td></td>
</tr>
<tr>
<td>MT8105</td>
<td>A-04/S-05</td>
<td>Electrochemical Energy Technology, (10.5)</td>
<td>R. Tunold</td>
<td>4/4</td>
<td></td>
</tr>
<tr>
<td>MT8200</td>
<td>S</td>
<td>Advanced Chemical Metallurgy (7.5)</td>
<td>L. Kolbeinsen</td>
<td>2/2</td>
<td></td>
</tr>
<tr>
<td>MT8201</td>
<td>S</td>
<td>Advanced Electrometallurgy (7.5)</td>
<td>L. Kolbeinsen</td>
<td>1/1</td>
<td></td>
</tr>
<tr>
<td>MT8202</td>
<td>S</td>
<td>High Temperature Plasma Technology, (7.5)</td>
<td>J. A. Bakken</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>MT8203</td>
<td>S</td>
<td>Dislocation Theory Applied to Thermo-Mechanical Treatments of Metals (6.0)</td>
<td>E. Nes</td>
<td>1/1</td>
<td></td>
</tr>
<tr>
<td>MT8204</td>
<td>S</td>
<td>Recrystallization and Texture (6.0)</td>
<td>E. Nes</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>MT8206</td>
<td>S</td>
<td>Iron and Steel Metallurgy (7.5)</td>
<td>Ø. Grong</td>
<td>2/2</td>
<td></td>
</tr>
<tr>
<td>MT8207</td>
<td>S</td>
<td>Electron Microscopy (7.5)</td>
<td>J. K. Solberg</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>MT8209</td>
<td>S</td>
<td>Failure Analysis of Metals (7.5)</td>
<td>J. K. Solberg</td>
<td>8/8</td>
<td></td>
</tr>
<tr>
<td>MT8212</td>
<td>S</td>
<td>Aluminium Alloys – Deformability (7.5)</td>
<td>H.J. Roven</td>
<td>1/1</td>
<td></td>
</tr>
<tr>
<td>MT8300</td>
<td>S</td>
<td>Electrolysis of Light Metals 2 (7.5)</td>
<td>H. Kvande</td>
<td>6/6</td>
<td></td>
</tr>
<tr>
<td>MT8304</td>
<td>S</td>
<td>Advanced Inorganic Chemistry (7.5)</td>
<td>M. Ystenes</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>MT8305</td>
<td>S</td>
<td>Cement Semestry (7.5)</td>
<td>H. Justnes</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>MT8306</td>
<td>S</td>
<td>Advanced Ceramics Processing (7.5)</td>
<td>M.-A. Einarsrud</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>MT8301</td>
<td>A-04/S-05</td>
<td>Electrochemical Kinetics, (12.0)</td>
<td>C. Rosenkilde, G. M. Haarberg</td>
<td>6/6</td>
<td></td>
</tr>
<tr>
<td>MT8304</td>
<td>A</td>
<td>Electrolysis of Light Metals 1 (7.5)</td>
<td>G.M. Haarberg, K.A. Paulsen</td>
<td>3/3</td>
<td></td>
</tr>
<tr>
<td>MT8205</td>
<td>A</td>
<td>Metallurgical Modelling of Welding (7.5)</td>
<td>Ø. Grong</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>MT8208</td>
<td>A</td>
<td>Fatigue of Metals (7.5)</td>
<td>H.J. Roven</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>MT8210</td>
<td>A</td>
<td>Advanced Solidification Metallurgy (7.5)</td>
<td>L. Arnberg</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>MT8211</td>
<td>A</td>
<td>Kinetics of Metallurgical Reactions (6.0)</td>
<td>T. Lindstad</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>MT8213</td>
<td>A</td>
<td>Modelling and Simulation of Materials Microstructure and Properties (7.5)</td>
<td>K. Marthinsen</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>MT8301</td>
<td>A</td>
<td>Carbon Materials Technology (7.5)</td>
<td>M. Sørli</td>
<td>14/14</td>
<td></td>
</tr>
<tr>
<td>MT8302</td>
<td>A</td>
<td>Advanced Solid State Chemistry, (15.0)</td>
<td>S. Julsrud</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>
## Graduated M.Sc. students with titles of their diploma works

### Physical metallurgy:

<table>
<thead>
<tr>
<th>Name and title</th>
<th>Supervisor</th>
<th>Examiner</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bojack, Andrea</strong>&lt;br&gt;Thermal stability of selected aluminium alloys</td>
<td>Professor Hans Jørgen Roven&lt;br&gt;Adjunct Professor Ola Jensrud</td>
<td>Examinined in Germany</td>
</tr>
<tr>
<td><strong>Bråten, Peter</strong>&lt;br&gt;In situ investigation of strain development during tensile testing of aluminium profiles – Portevin Le-Châtelier effect</td>
<td>Professor Hans Jørgen Roven&lt;br&gt;Adjunct Professor Jarle Hjelen</td>
<td>Professor Tor O. Sætre, Agder University College, Grimstad</td>
</tr>
<tr>
<td><strong>Coco, Lorenzo</strong>&lt;br&gt;Thermal and mechanical stability of an austenitic manganese (Hadfield type) steel</td>
<td>Professor Jan Ketil Solberg</td>
<td>Examinined in Italy</td>
</tr>
<tr>
<td><strong>Corso, Luca</strong>&lt;br&gt;Large strain behaviour of austenitic manganese steel</td>
<td>Professor Jan Ketil Solberg</td>
<td>Examinined in Italy</td>
</tr>
<tr>
<td><strong>Helvik, Ivar Amund</strong>&lt;br&gt;Fatigue at elevated temperatures – aluminium alloy development</td>
<td>Professor Hans Jørgen Roven</td>
<td>Dr.ing. Ketill O. Pedersen, SINTEF, Trondheim</td>
</tr>
<tr>
<td><strong>Grab, Thomas</strong>&lt;br&gt;The influence of TiB₂ particles on the growth of eutectic silicon in aluminium silicon alloys</td>
<td>Professor Lars Arnberg</td>
<td>Examinined in Germany</td>
</tr>
<tr>
<td><strong>Morgenstern, Roman</strong>&lt;br&gt;Nucleation of recrystallisation after hot deformation of aluminium alloys</td>
<td>Professor Knut Marthinsen</td>
<td>Examinined in Germany</td>
</tr>
<tr>
<td><strong>Mørkrid, Randi</strong>&lt;br&gt;In-situ investigations by SEM-texture development, grain rotations and slip activity</td>
<td>Professor Hans Jørgen Roven&lt;br&gt;Adjunct Professor Jarle Hjelen</td>
<td>Professor Tor O. Sætre, Agder University College, Grimstad</td>
</tr>
<tr>
<td><strong>Nerli, Lars Farmen</strong>&lt;br&gt;Thermoplastic material bumper beams combined with aluminium profiles</td>
<td>Professor Hans Petter Vedvik, Department of Engineering Design and Materials (IPM)</td>
<td>Carried out by external examiner at IPM</td>
</tr>
<tr>
<td><strong>Nordstrand, Erlend Fjøsne</strong>&lt;br&gt;Characterization of phases and reaction products in Ni and Fe based alloys exposed to metal dusting corrosion</td>
<td>Professor Øysteinn Grong</td>
<td>Dr.ing. Casper van der Eijk, SINTEF, Trondheim</td>
</tr>
<tr>
<td><strong>Sandberg, Håkon Edvard</strong>&lt;br&gt;Characterization of superplasticity in aluminium alloys processed by SPD-ECAP</td>
<td>Professor Hans Jørgen Roven</td>
<td>Dr.ing. Trond Furu, Norsk Hydro, Sunndalsøra</td>
</tr>
<tr>
<td><strong>Skevik, Håkon</strong>&lt;br&gt;Boronizing of H13 and QRO90 tool steel for improved wear resistance</td>
<td>Professor Jan Ketil Solberg</td>
<td>Siv.ing Bjørn Borchgrevink, Oslo</td>
</tr>
<tr>
<td><strong>Solheim, Hans Jørgen</strong>&lt;br&gt;Silicon deposition using SiHCl₃ for crystalline silicon thin-film solar cells</td>
<td>Professor Otto Lohne</td>
<td>Dr.ing. Harry M. Rong, Elkem</td>
</tr>
<tr>
<td><strong>Tangen, Øyvind Moe</strong>&lt;br&gt;Texture and microstructure evolution in aluminium-manganese alloys</td>
<td>Professor Erik A. Nes</td>
<td>Dr.ing. Hans Erik Vatne, Norsk Hydro, Holmestrand</td>
</tr>
</tbody>
</table>
## Extractive metallurgy:

<table>
<thead>
<tr>
<th>Name and title</th>
<th>Supervisor</th>
<th>Examiner</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feltstykket, Elisabeth</td>
<td>Professor Leiv Kolbeinsen</td>
<td>Professor Merete Tangstad</td>
</tr>
<tr>
<td>Quantitative analysis of powder mixing and connection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>to reaction progress</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Johnsen, Eirik Rabbe</td>
<td>Professor Leiv Kolbeinsen</td>
<td>Professor Merete Tangstad</td>
</tr>
<tr>
<td>Reducibility of ilmenite pellets</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Inorganic chemistry:

<table>
<thead>
<tr>
<th>Name and title</th>
<th>Supervisor</th>
<th>Examiner</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lyngdal, Tone</td>
<td>Professor Tor Grande</td>
<td>Professor Svein Stalen, University of Oslo</td>
</tr>
<tr>
<td>Mechanism of growth of ferroelectric nanorods</td>
<td></td>
<td></td>
</tr>
<tr>
<td>in sodiumchlorideflux</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hermundstad, John Arne</td>
<td>Professor Trygve Foosnæs</td>
<td>Dr.ing. Arne Petter Ratvik, SINTEF, Trondheim</td>
</tr>
<tr>
<td>Sodium expansion of cathode materials in cryolitic melts with excess of alumina</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Selbach, Sverre Magnus</td>
<td>Professor Tor Grande</td>
<td>Professor Svein Stalen, University of Oslo</td>
</tr>
<tr>
<td>The influence of grain size and the thermomechanical strain on the properties of ferroelectric polycrystals</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Electrochemistry

<table>
<thead>
<tr>
<th>Name and title</th>
<th>Supervisor</th>
<th>Examiner</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brynjulfsen, Synnøve Iren</td>
<td>Professor Geir Martin Haarberg</td>
<td>Professor emeritus Jomar Thonstad</td>
</tr>
<tr>
<td>Electrochemical behaviour of carbon in fluoride melts</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Burheim, Odne Stokke</td>
<td>Professor Geir Martin Haarberg</td>
<td>Professor Douglas Inman, Imperial College London, UK</td>
</tr>
<tr>
<td>Electrowinning of iron from chloride melts</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Huseland, Kristin</td>
<td>Professor Kemal Nisancioglu</td>
<td>Dr.ing. Astrid Bjørngum, SINTEF, Trondheim</td>
</tr>
<tr>
<td>Galvanic corrosion and crevice corrosion of carbon steel in marine environment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Haas, Ole-Erich</td>
<td>Associate Professor Børre Børresen</td>
<td>Trygve Burchardt, SINTEF, Trondheim</td>
</tr>
<tr>
<td>Synthesis and characterization of electrocatalysts for high temperature polymer fuel cells</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Karlsen, Camilla</td>
<td>Associate Professor Børre Børresen</td>
<td>Dr.ing. Trygve Burchardt, SINTEF, Trondheim</td>
</tr>
<tr>
<td>Development of electrocatalysts for high temperature polymer fuel cells</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Okstad, Trine</td>
<td>Professor Kemal Nisancioglu</td>
<td>Dr.ing. Hjalmar Sigurðsson, Norges forskningsråd, Oslo</td>
</tr>
<tr>
<td>Hydrogen evolution by cathodic protection of steel in natural seawater</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Osen, Karen Sende</td>
<td>Adjunct Professor Christian Rosenkilde</td>
<td>Dr.ing. Halvor Kvande, Norsk Hydro, Oslo</td>
</tr>
<tr>
<td>Behavior of moisture in cryolite melts</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transeth, Stine Sjøset</td>
<td>Professor Kemal Nisancioglu</td>
<td>Dr.ing. Otto Lunder, SINTEF, Trondheim</td>
</tr>
<tr>
<td>The effect of indium as a trace-element on the electrochemical properties of aluminium</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# Master of Science Programme in Light Metals Production:

<table>
<thead>
<tr>
<th>Name and title</th>
<th>Supervisor</th>
<th>Examiner</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Agyare-Asante, Samuel</strong>&lt;br&gt;An experimental study of processes taking place at the interface between liquid aluminium and alumina-silicate based refractory castables</td>
<td>Associate Professor Kjell Wiik</td>
<td>Dr. ing Bjarte Øye, SINTEF Trondheim</td>
</tr>
<tr>
<td><strong>Bonsu, Richard</strong>&lt;br&gt;C-activity in liquid alloys and slags</td>
<td>Professor Leiv Kolbeinsen</td>
<td>Dr.ing. Gabriella Tranell, SINTEF Trondheim</td>
</tr>
<tr>
<td><strong>Chithambaranadhan, Dilip</strong>&lt;br&gt;Refining and recycled PV silicon by filtration</td>
<td>Professor emeritus Thorvald A. Engh</td>
<td>Dr.ing. Martin Syvertsen, SINTEF, Trondheim</td>
</tr>
<tr>
<td><strong>Eticha, Gudina Andea</strong>&lt;br&gt;Synthesis of cathode materials with TiB₂ in the binder phase and testing of performance during aluminium electrolysis</td>
<td>Professor Trygve Foosnæs</td>
<td>Dr.ing. Arne Petter Ratvik, SINTEF, Trondheim</td>
</tr>
<tr>
<td><strong>Kazi, Saima Sultana</strong>&lt;br&gt;Silicon for solar cells</td>
<td>Professor Otto Lohne</td>
<td>Dr.ing. Rita Glenne, REC, Oslo</td>
</tr>
<tr>
<td><strong>Zhao, Dongju</strong>&lt;br&gt;Electrodeposition of iron from molten salts containing dissolved Fe₂O₃</td>
<td>Professor Geir Martin Haarberg</td>
<td>Dr.ing. Espen Olsen, SINTEF</td>
</tr>
</tbody>
</table>

Sean Gaal operating electric arc furnace.

Beate Reinskou investigating solar cell materials in SEM.
M.Sc. Students

Master of Science in Materials Technology (5 years)

3rd year:
Andersen, Elin Christine
Brinchmann, Kristoffer
Cao, Thienn Thanh Nguyen
Engbretsen, Torbjørn
Hagen, Hans Ove Tinnan
Helland, Tore
Johansen, Tor
Linderud, Simen
Nordnes, Elise Tverberg
Rønningen, Dag
Slevolden, Elisabeth
Stangeland, Helga Wiig
Strømstad, Stian
Søfferud, Mario Kokolakis
Vingsand, Håvard

4th year:
Binaa-Faal, Navid
Eikenes, Kim Haave
Festervoll, Knut
Gran, Håkon
Hermstad, Andreas
Hilden, Erik
Haaaland, Bjørnar Øvrum
Karlset, Rolf Magne
Krog, Kaja
Lerstad, Dag Ola
Lillevik, Håkon
Nguyen, Hue Thai
Nygård, Ane
Nygård, Ida
Rotan, Magnus
Sandbu, Paal Henrik
Seim, Stian
Sjølie, Stian
Syvertsen, Guttorm Ernst
Van Vo, Thang
Westermann, Ida
Wiig, Kenneh
Wåsjø, Johanna
Østrem, Øyvind

5th year:
Løken, Sondre
Mikalsen, Christian
Opdahl, Christian
Rise, Henrik
Reinskou, Beate
Skjevrak, Sveinung
Wangensteen, Torgeir

Master of Science in Chemistry and Biotechnology, Specialization in Materials Chemistry and Energy Technology

3rd year:
Bjørnstad, Maren
Brandtzeg, Aleksander Richard Merkesvik
Dahlstrøm, Per Kristian
Eikvik, Tine
Fredriksen, Asle
Halvorsen, Magnus Torleif Rune Printzell
Holme, Caroline
Nærland, Kristine Uberg
Onsrud, Morten Andreas
Pedersen, Øystein Edland
Ramdal, Ingunn
Svanberg, Ida
Wollan, Camilla Skotnes
Ystad, Michelle Cecilia
Østby, Heidi Therese

4th year:
Asbjørnsen, Ingvild
Falstad, Merethe
Fossan, Åse-Lill
Halvorsen, Magnus
Hjertaker, Vigdis
Hognes, Erik Skontorp
Iglebekk, Eivind
Kjos, Sigmund
Ludvigsen, Marte
Rey, Simon Scheel
Skjeldstad, Aslak
Stabelli, Tone Hansen
Syre, Marie Vardenær
Tennøe, Andreas
Øyen, Anne

5th year:
Boberg, Linn
Frydenberg, Tone
Hals, Stine
Jahren, Hans Martin
Ljones, Nina
Mo, Torunn Stub
Owe, Lars-Erik
Pedersen, Anne Marthe
Rannestad, Øyvind Gustav
Slåtten, Selvi
Yttrevik, Stian Hatling
Aaserud, Siw-Christin

Master of Technology in Materials Technology (2 years)

(Master Programme in Materials Technology for Engineers)

Helgetun, Brynjar Hoff
Karlsen, Linda
Nijs, Oscar Cornelis Johanna
Solem, Ola

Master of Science Programme in Light Metals Production

1st year:
Gelaw, Tilahun Kidanemariam (Ethiopia)
Bensah, Yaw Delali (Ghana)
Damoah, Lucas Nana Wriedu (Ghana)
Adegboyega, Nathaniel Femi (Ghana)
Balaba, Ronald Sempagama (Uganda)
Gaertner, Heiko (Germany)
Einarsrud, Sigurdur Agust (Iceland)
Wang, Zhaoxui (China)

2nd year:
Adjaye-Mensah, Edward (Ghana)
Adodo, Michael Ehichioya (Nigeria)
Akthar, Shahid (Pakistan)
Boateng, Abraham (Ghana)
Hussain, Tajammul (Pakistan)
Tettey, Anita Naa Nyerley (Ghana)

Foreign guest students at Department of Materials Science and Engineering

Bauch, Carola Alexandra (Germany)
Bettella, Diego (Italy)
Chantreux, Claire (France)
Chia Yen Tat, Albert (Singapore)
Ciftja, Arian (Albania)
Classeau, Maxime (France)
Coco, Lorenzo (Italy)
Corsi, Luca (Italy)
Crespo Robles, Eloy (Spain)
Di Primio, Stefano (Italy)
Le Manchet, Sandra (France)
Meskers, Christina (The Netherlands)
Morgenstern, Roman (Germany)
Nitsche, Fabian (Germany)
Singh, Deepal Singh (Singapore)
Slizovskiy, Dmitriy (Russia)
Tocco, Alessio
Votrubec, Martin (Czech Republic)
Åkesson, Per (Sweden)
Extracurricular activities
Honours, Participation in Courses, Conferences, Lectures and Study Visits

Arnberg, Lars
Lars Arnberg was the head of Department of Materials Science and Engineering until August 1, 2005. He is an Affiliate Professor at the Department of Mechanical Engineering, Worcester Polytechnic Institute, USA. Lars Arnberg is representing NTNU on the Board of SINTEF Materials and Chemistry and is the leader of the strategic university program Light Metals Technology. He was also, in 2005, a member of an international expert panel for evaluation of the research at Department of Technology and Management, University of Padova, Italy.

AIM, Milano, Italy, January 21, 2005. Kick-off meeting of EU-project METRO.
Düsseldorf, Germany, March 3, 2005. Meeting on EU-proposal NADIA.
Padova, Italy, September 2, 2005. Final meeting on EU-proposal NADIA.
Ferrari Auto, Maranello, Italy, September 7, 2005. Study visit.
AIM Seminar, Vicenza, Italy, September 16, 2005. Lecture on: “A new X-ray technique to monitor solidification”.
LPM, Padova, Italy, September 22, 2005. Study visit.
TCN-CAE International Conference, Lecce, Italy, October 5-7, 2005. Lecture on: “Experimental support for solidification models”.
Raffineria Metalli Capra, Brescia, Italy, October 14, 2005. Study visit.

Dahl, Paul Inge
Workshop FOET project, Trondheim, Norway, June 1, 2005. Lecture on: “Synthesis and densification of SrCeO3 and BaZrO3 materials”.
Workshop University Rennes, NTNU, Trondheim, Norway, June 17, 2005. Lecture on: “Synthesis and densification of SrCeO3 and BaZrO3 materials”.
Workshop FOET project, Oslo, Norway, November 10-11, 2005. Lecture on: “SrCeO3 and BaZrO3 materials, routes to overcome the sintering challenges”.

Di Sabatino, Marisa
International Conference in Advances in Solidification and Processes, Stockholm, Sweden, June 7-10, 2005. Lecture on: “The influence of oxide inclusions on the fluidity of Al-7wt.%Si alloy”. AWARD for 2nd Best Student Presentation, 1000,0 USD.
10th International Conference on Aluminium, Klizkow, Poland, October 12-14, 2005. Lecture on: “The role of temperature and alloy chemistry on the fluidity of aluminium foundry alloys”.

Einarsrud, Mari-Ann
Mari-Ann Einarsrud is a member of the board of the PROSBIO research program, The Research Council of Norway.
2nd national FUNMAT meeting, Olavsgaard, Hvam, Norway, January 5-7, 2005.
The Research Council of Norway, Oslo, Norway, April 18, 2005. Board meeting for research program PROSBIO.
Staffanstorp, Sweden, April, 27-29, 2005. Project meeting, EU project HILLIT+.
Kyoto University, Kyoto, Japan, June 13, 2005. Study visit.
Osaka Prefecture University, Osaka, Japan, June 14, 2005. Study visit. Lecture on: “Wet chemical synthesis of inorganic and ceramic materials.”
Dohisha University, Tanabe Campus, Kyoto, Japan, June 15, 2005. Study visit.


Copenhagen, Denmark, June, 29-30, 2005. Project meeting, EU project HILIT+.

The Research Council of Norway, Oslo, Norway, August 23, 2005. Board meeting for research program PROSBIO.

Seminar NTVA 50 year Anniversary, Trondheim, Norway, September 9, 2005.

Freiburg, Germany, September 15-16, 2005. Project meeting, EU project HILIT+.

Rise National Laboratory, Roskilde, Denmark, November 3, 2005. Study visit. Lecture on: “Ceramic materials for energy technology – research activities at NTNU”.

MRS Meeting, Boston, USA, November 28-December 2, 2005. Poster: “Non-elastic deformation of LaCoO$_3$-based ferroelastic ceramics”.

Espelund, Arne
Course in basic metallurgy for copper and iron for personnel at the technical museums Norsk Bergverksmuseum, Næs Jernverksmuseum, Rørosmuseet, Folldal gruve museum and others, Folldalen, Norway, September 13-14, 2005.

Development of recreation facilities for the students in Materials Technology at Leset copper works in Haldalen, which also will be presented in a better way to the public.

Fjeldberg, Egil

Carnegi Mellon University, Pittsburgh, Pennsylvania, USA, November 4-11, 2005. Study visit to professor Antony Rollet.

Foosnæs, Trygve


Hydro Aluminium AS, Technology and Operational Support, Årdal, Norway, June 6-8, 2005. Project presentation by PhD candidates; discussions on future research cooperation.


European Aluminium Technology Platform launch, Brussels, Belgium, November 23, 2005.

Friis, Jesper
KMB seminar, Trondheim, Norway, January 21, 2005. Lecture on: “An extension of the NaMo model to include particle formation in liquid phases”.

Termo Tech meeting, Trondheim, Norway, January 25, 2005. Lecture on: ”Development of a precipitation model for liquid metal refining and its coupling to computational fluid dynamics (CFD)”.


First Chinese-Norwegian Seminar on Light Metals, Trondheim, Norway, August 30, 2005. Lecture on: ”Modelling of precipitation and work hardening in Al-Mg-Si alloy”.

KMB seminar, Trondheim, Norway, November 1, 2005. Lecture on: ”Precipitation and work hardening”.

Norlight lunch meeting, Trondheim, Norway, December 6, 2005. Lecture on: ”Modelling of precipitation and work hardening”.

Grande, Tor
Tor Grande is the head of the department. He is the leader of Functional Materials within the strategic research area Materials at NTNU and a board member of NTNU Nanolab. He is also the coordinator of the scientific advisory committee of the Norwegian research alliance FUNMAT. He was also the Departments representative in the project group concerning the reconstruction of Chemistry building II.


Lecture on: “Laboratory infrastructure”.


FUNMAT scientific advisory committee and steering committee meetings, Oslo and Trondheim, Norway, January 7, February 28, March 2, May 23, June 23 and September 6, 2005.


Workshop arranged by The Gas Technology Center NTNU-SINTEF, Selbu, Norway, February 2, 2005. Lecture on: “CO2 capture and storage”.

Department seminar, Storlien, Sweden, May 12-13, 2005.


Project Workshop “Functional oxides for energy technology”, Trondheim, Norway, June 1, 2005.


Course for Department Head’s at NTNU, Trondheim, Norway September 14-15, and Oppdal, Norway, October 24-25, 2005.

Project Workshop “Functional oxides for energy technology”, Oslo, Norway, November 11, 2005.


Denmark Technical University, Lyngby, Denmark, December 20, 2005. Thesis evaluation committee.

**Görner, Harald**


Seminar NorLight Stykkstaping, Trondheim, Norway, November 16-17, 2005. Lecture on: “Kinetics of an AlF3 aluminium filter”.

**Hajasova, Jana**


Southampton Electrochemistry – Summer School, Southampton, United Kingdom, June 26-July 1, 2005.

EUROMAT Conference, Prague, Czech Republic, September 5-8, 2005. Poster session and discussions.

KIFEE workshop, Kyoto, Japan, October 4-8, 2005. Lecture on: “Electrochemical behaviour of sulphate anions in molten salts”.

**Haarberg, Geir Martin**

University of Valladolid, January-February, 2005. One week study visit including lecture.

Aichi (EXPO), Tsukuba (AIST), Doshisha University and Tokyo (Hydrogen and Materials Seminar), May 24-27, 2005. Study tour including visits.

University of Cambridge, June-July, 2005. Five weeks study visit including supervision of master student.

Molten Salts Discussion Group, Cambridge, United Kingdom, July 13-14, 2005. Lecture on: “Electrodeposition and nucleation of lead and iron from chloride melts”.

KTH, Stockholm, Sweden, August 24, 2005. Member of committee for PhD defence.


ULCOS Congress, Aveiro, Portugal, September 21-22, 2005. Invited lecture on: “Middle temperature electrolysis. electrowinning of iron from molten salts”.


KIFEE Workshop, Kyoto, Japan, October 5-7, 2005. Plenary lecture and lecture.

Institut National Polytechnique de Grenoble, France, November 9-12, 2005. Study visit and opponent during PhD defence.

**Jensen, Morten Sundheim**

Hydro Aluminium AS, Årdal, Norway, June 6-7, 2005. Study visit and meeting. Lecture on: “Chemical degradation, wetting and electrochemical properties of polycrystalline TiB2 inert cathodes”.

Annual ThermoTech Seminar, Norwegian University of Science and Technology, Trondheim, Norway, December 2, 2005.

**Jonasson, Lina M.**


Carbon 2005, Gyeongju, South Korea, July 3-7, 2005. Poster:
“Electrochemical formation of carbon nanostructures in fluoride melts”.


Kaczorowski, Jakub


Coal mine Knurow, Coke plant Zdziezowice, Institute for Chemical Processing of Coal (ICP) and Silesian University of Technology, Faculty of Mining and Geology, Gliwice, Poland, April 11-13, 2005. Educational excursion and networking.

TU-Bergakademie Freiberg, Germany, April 14-16, 2005. Study visit.

Blue Gem coal mine and preparation plant (KY), Center for Applied Energy Research (CAER), University of Kentucky, (KY) and R&D Carbon Petrography, Monroeville (PA), USA, May 22-25, 2005. Educational excursion and networking.

Internal course arranged together with Viktor Myrvågnes, NTNU, Trondheim, Norway, January 28, 2005. “Analyses and characterization of carbon materials”.

Kolbeinsen, Leiv
Professor Leiv Kolbeinsen is a board member of FFF (The Norwegian Ferroalloy Producers’ Research Organization). Meetings were held in Trondheim, Norway; February 6; May 4 and September 1, 2005. Workshop 3, Foresight-project on Materials arranged by The Norwegian Research Council in 2004 and 2005, January 26, 2005. IFE (Institute for Energy Technology, Kjeller, Norway); February 15-16 and April 27-28, 2005. Visits. Seminar held at Glashaugen, Trondheim, Norway, with participants from industry, government and academia/research communities, June 20, 2005. Lecture on “Metallurgical use of natural gas”.


CarboMat Seminar, NTNU, Trondheim, Norway, September 7-8, 2005. Poster session.


150th Annual meeting Iron and Steel Institute of Japan (ISIJ), September 28-30, 2005. Lecture on: “Dispersoids and their effect on solidification structure”.

Visit by Sten Ångström (ULCOS-project/MEFOS-cooperation), October 17, 2005.

Kvande, Rannevig

BEST-course, Trondheim, Norway, August 7-20, 2005. Lecture on: “Casting - principles and solidification of silicon”.


Kvithyld, Anne
Anne Kvithyld was a coordinator for Marie Curie Training Site in recycling light metals for high value-added use. She had partly maternity leave. From September she has been visiting researcher at Colorado School of Mines.


Colorado School of Mines, USA, with Professor Patrick Taylor. September 1, 2005-July 1, 2006. (Grant: Leiv Eiriksson mobility program Norway-USA/Canada).

Hydro Magnesium AS, Porsgrunn, Norway, April 1, 2005. Meeting.


Professor Sachiko Ono (Kogakuin University, Tokyo), Professor Tetsuchi Motegi, Professor Hiroshi Tamehiro, Lecturer Dr. Yosuke Tamura, Researcher Dr. Fumi Tanabe, Chiba Institute of Technology. August 18, 2005. Meeting on atmosphere alternative for SF₆ for a magnesium casting.


Larsen, Magnus Hurlen
Researchers’ night, NTNU, Trondheim, Norway, September 23, 2005. Closing lecture with subsequent fireworks display: “Fireworks - history and principles”.
Larsen, Sten Yngve
Seminar at Department of Materials Science and Engineering, April 28, 2005. Lecture on: “Utilisation of catalytically grown carbon fibres in metallurgical applications”.


Carbomat steering committee meeting, NTNU, Trondheim, Norway, June 14, 2005. Lecture on: “Improving fracture thougness of electrodes by carbon nanofibre addition”.

Carbon 2005, Gyeongju, South Korea, July 3-7, 2005. Poster: “Carbon nanofibres in large-scale electrode application”.

Elkem ASA Carbon, Kristiansand, Norway, August 18-23, 2005. Study visit and experimental work.

CarboMat Seminar, NTNU, Trondheim, Norway, September 7-8, 2005. Poster session and discussions.


Larsen, Tore

SPE Seventh International Symposium on Oilfield Scale, Aberdeen, United Kingdom, May 11-12, 2005.

Lindstad, Tor


Coal mine Knourow, Coke plant Zdieszowice, Institute for Chemical Processing of Coal (IChPWi), Silesian University of Technology, Faculty of Mining and Geology, Gliwice, Poland, April 11-13, 2005. Networking trip with industry (Elkem, Finnfjord, NTNU).

International Conference on Coal Science and Technology, Okinawa, Japan, October 9-14, 2005.


Lohne, Otto
Institute of Archaeology, University College London, United Kingdom, May 27, 2005. Visit to discuss production of coins in medieval ages with Professor Thilo Rehren.

Department of Materials Science and Engineering, NTNU, Trondheim, Norway, August 7-20, 2005. Planned and taught at a summer school in co-operation with the local unit of Board of European Students of Technology (BEST). Lecture on: “Solar Cells - Power the Future”.

Department of Materials Science and Engineering, NTNU, Trondheim, Norway. Administred the purchase of a Glow Discharge Mass Spectrometer unit. The equipment was installed in November.

Marthinsen, Knut
Knut Marthinsen is deputy head at the Department of Materials Science and Engineering. He is member of the International Committee for the Joint International Conferences on Recrystallization and Grain Growth, and is also chairman of the Steering Committee for the Norlight project “Heat treatment fundamentals”.

Department of Materials Science and Engineering, Delft University of Technology, the Netherlands, April 26, 2005. PhD defence for Zacharias Lok.

Seminar on Atomistic Modelling in Aluminium Alloys, June 23-24, 2005. Co-organized, together with Professor Randi Holmestad, Department of Physics, NTNU.

Department of Physics, University of Oslo, Norway, August 26, 2005. PhD defence for Steinar Foss.

Institute of Physical Metallurgy and Metal Physics Department, RWTH Aachen, Germany, from medio September to medio December, 2005. Extended visit.


European Synchrotron Radiation Facility, Grenoble, France, November 10-13, 2005. Lecture on: “Experiments at the materials science beam line ID11”.

AluNorf, Neuss, Germany, November 22, 2005. Visit to the world’s largest rolling mill for aluminium.


SFB 370 (German Sonder Forschungs Bereich) Final Symposium “Integral materials modelling”, Aachen, Germany, December 1-2, 2005.

Institute of Physical Metallurgy and Metal Physics Department, RWTH Aachen, Germany. Invited lecture on: “Modelling precipitation and work hardening in age-hardenable aluminium alloys”.

Workshop University Rennes/NTNU, Trondheim, Norway, June 17, 2005. Lecture on: “Sintering and microstructure studies of La$_{0.995}$Sr$_{0.005}$NbO$_4$.

Project meeting, FOET project, Oslo, Norway, November 10-11, 2005. Lecture on: “Sintering and Characterization of La$_{1-x}$A$_x$NbO$_4$ (A=Ca, Sr and Ba) proton conductors”.

M. Myrvågnes, Viktor A. K.
McMaster University, Hamilton, Ontario, Canada, May 16-20, 2005.
Cokemaking course.


Coal mine Knourow, Coke plant Zdziezowice, Institute for Chemical Processing of Coal (ICHPW) and Silesian University of Technology, Faculty of Mining and Geology, Gliwice, Poland, April 11-13, 2005.

Myrvågnes, Viktor.A. K.
Fellowship to research on electrochemistry and corrosion of aluminium alloys” and “Light Metal Surface Science project activities in Norway”.

International Workshop on Aluminium Surface Technology, Bonn, Germany, August 29-30, 2005.

Collaboration strategy on superhydrophilicity and surface wettability.


-Lecture on: “Cation diffusion in LaMnO$_3$ based on the solid state reaction method”.


2nd FUNMAT Program Annual Conference, Olavsgaard, Oslo, Norway, January 5-7, 2005.
Lecture on: “Challenges in surface exchange measurement and modeling”.


Group Meetings.

Lectures on: “Effect of low melting point trace element segregation on electrochemistry and corrosion of aluminium alloys” and “Light metal surface science project activities in Norway”.

Myrvågnes, Viktor.A. K.


PhD defense committees, Hilde Lea Lein, April, 22, 2005.

Board member “Student prize for outstanding work on ecological aspects of materials technology at NTNU” (“Bardal Fund”).

Coauthor of papers entitled: “Passivity breakdown of aluminium alloys by surface enrichment of group IIIA - VA trace elements” and “Passivity breakdown of aluminum alloys by trace element lead”.

Coauthor of paper: “Effect of non-uniform reaction rates at solid oxide interfaces on the electrochemical impedance”.

7th European Symposium on Electrochemical Engineering, Toulouse, France, October 3-5, 2005.
Coauthor of paper: “Charge and mass transfer at porous electrode - solid state electrolyte interface”.

Workshop on Control and Exploitation of Surface Topography and Near Surface Microstructures, Schaffhausen, Switzerland, October 5-6, 2005.
Invited lectures on: “Activation by segregation of low melting point elements” and “Grain boundary nanostructure and intergranular corrosion of low copper 6000-series alloys”.

Workshop on Hydrogen Induced Stress Cracking, Hydro Oi l and Gas, Sandvik, Oslo, Norway, November 15, 2005.
Invited lecture on: “Hydrogen generation on cathodically protected steel in seawater”.

Department of Metallurgy and Materials, University of Birmingham, United Kingdom, December 8, 2005. Examiner, PhD defense Yudie Yuan.

M. Nisancioglu, Kemal
Various meetings, NorLight Program, Light Metal Surface Science Research Project:
- Resource Group meetings, Trondheim, Norway, March 14, May 24, October 20, 2005.

2nd FUNMAT Program Annual Conference, Olavsgaard, Oslo, Norway, January 5-7, 2005.
Lecture on: “Challenges in surface exchange measurement and modeling”.


Group Meetings.

Lectures on: “Effect of low melting point trace element segregation on electrochemistry and corrosion of aluminium alloys” and “Light metal surface science project activities in Norway”.

Myrvågnes, Viktor.A. K.


PhD defense committees, Hilde Lea Lein, April, 22, 2005.

Board member “Student prize for outstanding work on ecological aspects of materials technology at NTNU” (“Bardal Fund”).

Coauthor of papers entitled: “Passivity breakdown of aluminium alloys by surface enrichment of group IIIA - VA trace elements” and “Passivity breakdown of aluminum alloys by trace element lead”.

Coauthor of paper: “Effect of non-uniform reaction rates at solid oxide interfaces on the electrochemical impedance”.

7th European Symposium on Electrochemical Engineering, Toulouse, France, October 3-5, 2005.
Coauthor of paper: “Charge and mass transfer at porous electrode - solid state electrolyte interface”.

Workshop on Control and Exploitation of Surface Topography and Near Surface Microstructures, Schaffhausen, Switzerland, October 5-6, 2005.
Invited lectures on: “Activation by segregation of low melting point elements” and “Grain boundary nanostructure and intergranular corrosion of low copper 6000-series alloys”.

Workshop on Hydrogen Induced Stress Cracking, Hydro Oi l and Gas, Sandvik, Oslo, Norway, November 15, 2005.
Invited lecture on: “Hydrogen generation on cathodically protected steel in seawater”.

Department of Metallurgy and Materials, University of Birmingham, United Kingdom, December 8, 2005. Examiner, PhD defense Yudie Yuan.

M. Palcut, Marian
2nd national FUNMAT meeting, Olavsgaard, Hvam, Norway, January 5-7, 2005. Lecture on: “Diffusion of manganese cations in lanthanum manganite”.

FOET workshop, Norwegian University of Science and Technology, Trondheim, Norway, June 1, 2005.

26th Risø International Symposium on Materials Science, Risø National Laboratory, Roskilde, Denmark, September 4-8, 2005.
Lecture on: “Determination of Mn$^{3+}$ diffusion in LaMnO$_3$ based on the solid state reaction method”.

FOET workshop, SINTEF and University of Oslo, Norway, November 10-11, 2005. Lecture on: “Cation diffusion in LaMnO$_3$ and LaCoO$_3$ studied by the solid state reaction method”.

M. Roven, Hans Jørgen
Leader of FORMLAB, the Mechanical testing laboratory at the MSE department and the NanoSPD group at NTNU emphasizing bulk nanostructuring of metals.

Member of the www.nanospd.org promoting international research on nanostructured metals and alloys and new processing techniques.
Group of Leaders for the Thematic Priority Area Materials at NTNU and a special responsibility for Light Metals.

NTNU representative in the Executive Coordination Committee for the Michigan Tech/NTNU/Hydro partnership.

Member of the National Advisory Group to the Research Council of Norway (NFR) on Engineering Sciences in Norway and here special responsible for Materials.

Per-reviewer to a central EU member state Research Council, and ad-hoc reviewer for another EU member state research council.

TMS annual meeting, San Francisco, USA, February 13-18, 2005. Invited lecture on: “Microstructure and texture evolution during ECAP of an AlMgSi alloy: observations, mechanisms and modeling”.


Helsinki Technological University, Helsinki, Finland, April 19-21, 2005. Visit.

Official signment of the Agreement on Collaboration (MoU) between Shanghai Jiao Tong University and NTNU, Shanghai, China, May 10, 2005.

Nordic Centre 10-year Anniversary Seminar and Official Ceremony, Fudan University, Shanghai, China, May 8-10, 2005.


Institut Franco-Allemand de Recherches de Saint Louis (ISL), Germany/France, August 18, 2005. Visit.


NTNU representative Advisory Committee meeting for the NFR program ‘Norlight’, Oslo, Norway, September 15, 2005.

The NanoSPD 3 Conference, Fukuoka, Japan, September 22-26, 2005. Lecture on: “Aluminium alloys subjected to SPD – an evaluation of achieved mechanical properties”. Posters: “Continuous severe plastic deformation of Al-Mg-Si alloys” and “Particle breakup, microstructure evolution and properties of recycled aluminium alloys processed by ECAP”.


Tsinghua University, Beijing, and Shanghai Jiao Tong University, Shanghai, China, October 25-27, 2005. Seminars/study visit. A delegation from NTNU, led by president Torbjørn Digernes, visited Tsinghua University and Shanghai Jiao Tong University to establish scientific cooperation between NTNU and the two Chinese universities within renewable energy research.


CarboMat Seminar, Trondheim, Norway, September 7-8, 2005. Poster session and discussions.
Tunold, Reidar
Hydro Research Forum, Norsk Hydro ASA, Porsgrunn, Norway; June 2-3, 2005. Lecture on: "Perspectives and challenges in water electrolysis".


The 8th Frumkin Symposium: "Kinetics of Electrode Processes", Russian Academy of Science, Moscow; Russia, October 18-22, 2005. Lecture on: "Electrocatalysts for water electrolysis using polymer exchange membrane".

Ulseth, Pål


Vasshaug, Kristin
CarboMat Meeting, Trondheim, Norway, January 24, 2005. Lecture on: "Electrochemical wear of carbon materials".

Internal Seminar, Department of Materials Science and Engineering, Trondheim, Norway, March 3, 2005. Lecture on: "Electrochemical wear of carbon materials".


Hydro Aluminium AS, Årdal, Norway, June 6-7, 2005. Study visit and meeting. Lecture on: "Electrochemical wear of carbon materials in fluoride melts".


Annual CarboMat Seminar, Trondheim, Norway, September 7-8, 2005. Poster: "Cathodic behavior of carbon in NaF-AlF₃-Al₂O₃ melts".

Kiffe Workshop, Kyoto, Japan, October 6-7, 2005. Lecture on: "Cathodic behavior of carbon in cryolite-alumina melts".

Meeting with Cathie Vix-Cuterl from Institut de Chimie des Surfaces et Interfaces, ICSI – CNRS, France in Trondheim, Norway, December 8, 2005. Lecture on: "Electrochemical Wear of Carbon Materials".

Westermoen, Andreas


Weydahl, Helge

Japan-Norway Seminar, Tokyo, Japan, May 27, 2005. Lecture on: "Fuel cell and hydrogen research at SINTEF and NTNU".

Wiik, Kjell
2nd national FUNMAT-meeting, Quality hotel Olavsgaard, Hvam, Norway, January 5-7, 2005. Lecture on: "Spray pyrolysis-synthesis of ceramic powders for energy technology".

COST-539 Electroceramics from Nanopowders Produced by Innovative Methods (ELENA), 1st MC Meeting, Brussels, Belgium, June 23, 2005.


26th Risø International Symposium on Materials Science, Risø, Denmark, September 4-8, 2005.

FUNMAT-subproject meeting, Functional Oxides for Energy Technology (FOET), SINTEF, Oslo, Norway, October 10-11, 2005.

Østvold, Terje
Professor Terje Østvold was a member of the SINTEF board to April 2005. Board meetings 2005: February 8, March 30 and the yearly strategy meeting was held at Lysebu, Oslo, Norway, May 25-26, 2005. He was also a member of the SINTEF advisory board. His last board meeting was held in Trondheim, Norway, April 20, 2005.


Terje Østvold was a member of the FUNMAT board until July 1, 2005. Meeting: Oslo, Norway, January 28, 2005.


Eiksundtunnelen, Norway, September 13-16, 2005. Technology test water proofing of tunnels. Cooperation with SINTEF Petroleum Research. Project meetings and
The importance of accurate temperature-pressure data in CaCO₃ gas.

Université Laval, Quebec City, Canada, April 6, 2005. Discussion of mainly from primary aluminium production.

16th International Oil Field Chemistry Symposium, Gello, Norway, March 13-16, 2005. Member of committee and session Chairman. Papers:
1. Quasi natural consolidation of poorly consolidated oil field reservoirs.
2. Vapour pressure of components made by the presence of HgS(s,α) in an oil/gas reservoir and consequences for the produced gas.
3. The importance of accurate temperature-pressure data in CaCO₃ scale predictions. How can such data be obtained?


Project meeting with STATOIL, IFE and Hydro on the ”Snøhvit” project. Kjeller, Norway, February 9, and Statoil, Trondheim, Norway, May 4 and October, 2005.

ICE/HT-FORTH, Patras, Greece, June 5-July 6, 2005. Study visit. Terje Østvold is a member of the TEKNA Oil field chemistry symposium board. Meetings in Oslo, Norway, October 12, 2005.

Buenos Aires oil and gas research institutions, Buenos Aires, Argentina November 17-December 6, 2005. Study visit.

Instituto Argentino del Petroleo y del Gas, Buenos Aires, Argentina, November 23, 2005. Paper: “Scale and mineral precipitation. How can the problem be dealt with in view of the needs of the Argentinean industry?”.

Øye, Harald A.
Harald A. Øye is chairman of the technical committee ISO TC 225 (Materials for the Production of Primary Aluminium). He was a board member of Museum of Natural History and Archaeology, Trondheim, Norway, to June 31, 2005. He is member of the Scientific Board for the company Metalysis, Rotherham, United Kingdom.


Department of Physics, Norwegian University of Science and Technology, Trondheim, Norway, February 25, 2005. Lecture on: “Aluminium electrolysis, principles, environmental concensus and new technology”.


Université Sherbrooke, Sherbrooke, Canada, April 3-5, 2005. Discussion of cooperation and lecture on: “Research activities and industry cooperation at Department of Materials Technology, Norwegian University of Science and Technology, with examples mainly from primary aluminium production.”.

Université Laval, Quebec City, Canada, April 6, 2005. Discussion of cooperation and lecture on: “Research activities and industry cooperation at Department of Materials Technology, Norwegian University of Science and Technology, with examples mainly from primary aluminium production.”.

Université du Quebec á Chicoutimi, Canada, April 7, 2005. Discussion of cooperation.

Alcan Conference Center, Chicoutimi, Canada, April 8, 2005. Lecture on: “Research activities and industry cooperation at Department of Materials Technology, Norwegian University of Science and Technology, with examples mainly from primary aluminium production”.


The 124th International Course on Process Metallurgy of Aluminium, Trondheim, Norway, May 30-June 3, 2005. Chairman and lectures on: “The principles of aluminium electrolysis” and “How to obtain long-lived cells”.


MOLTECH, Sierre, Switzerland, June 15, 2005. Research program discussions.


IMPEC, Årdal, Norway, August 4-5, 2005. Planning of research project.

The 7th International Symposium on Molten Salt Chemistry and Technology, Toulouse, France, August 27-September 2, 2005. Lecture on: “Penetration of sodium into cathode carbon during aluminium electrolysis”.


Institute of High-Temperature Electrochemistry, Russian Academy of Sciences, Ural Division, Ekaterinburg, Russia, September 19-22, 2005. Lectures on: “The principles of aluminium electrolysis”, “Cathode materials”, “Cathode construction”, “International standard (ISO) testing of materials used in the aluminium industry” and “Chemical reaction and physical changes”.

energy, heat balance, cell dynamics”, “Test procedures. ISO standardization work”, “Autopsy manual”, “How to obtain long lived cells”, and “Spent potlining treatment”.

In-Situ Analysis, Hørsholm, Denmark, October 28, 2005. Project meeting.

Polyteknisk Forening, Oslo, Norway, November 29, 2005. Received the 2005 Honorary Prize from the Sam Eyde Foundation.


Åkre, Torjus


KIFEE workshop, Kyoto, Japan, October 5-7, 2005. Lecture on: “The anode process during cobalt electrowinning”.

Notes:
NTNU – Innovation and Creativity
The Norwegian University of Science and Technology (NTNU) in Trondheim represents academic eminence in technology and the natural sciences as well as in other academic disciplines ranging from the social sciences, the arts, medicine, architecture to fine arts. Cross-disciplinary cooperation results in ideas no one else has thought of, and creative solutions that change our daily lives.

Department of Materials Science and Engineering
Norwegian University of Science and Technology
NO-7491 Trondheim, Norway