Characterisation of a nickel-base superalloy for use in off-shore gas turbines

Gas turbine blade materials are designed to endure a severe high-temperature environment for long periods of time.

Nickel-base superalloys are extensively used for this purpose due to their excellent mechanical properties and oxidation resistance at high temperatures. Quantitative knowledge about the microstructural changes that takes place in these alloys over time at high temperatures is a key factor in improving the service life of such components.

The aim of a current project at IMT is to characterise and evaluate unused 1st stage high-pressure turbine blades intended for use in industrial gas turbines. The blades are cast single crystal components made from a nickel-base superalloy, and are coated with a platinum-modified diffused aluminide coating for increased oxidation- and hot-corrosion resistance. The purpose of the investigation is to produce a reference for future investigations of the same type of turbine blade after service, i.e. to serve as a documentation of the "as new" condition of this type of turbine blade. StatoilHydro is a co-operation partner in the project.

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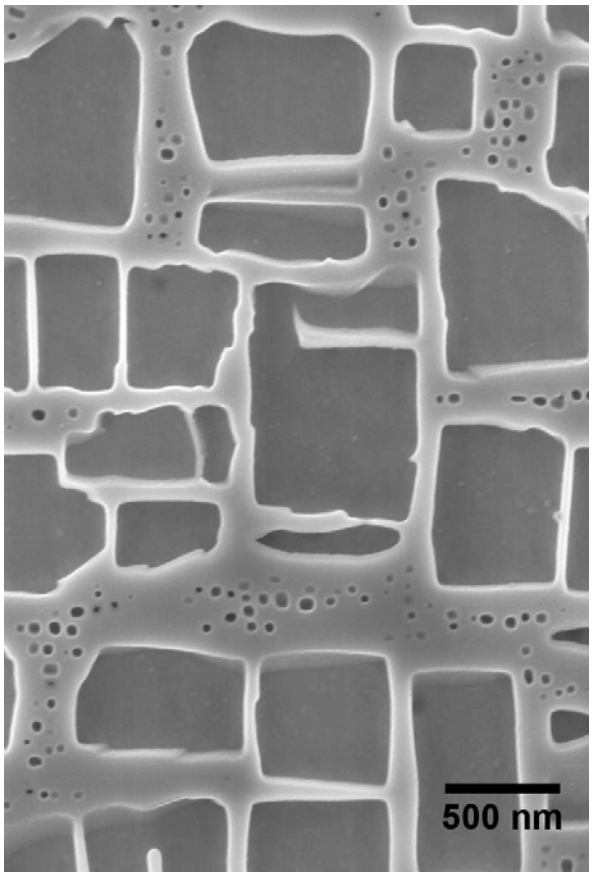
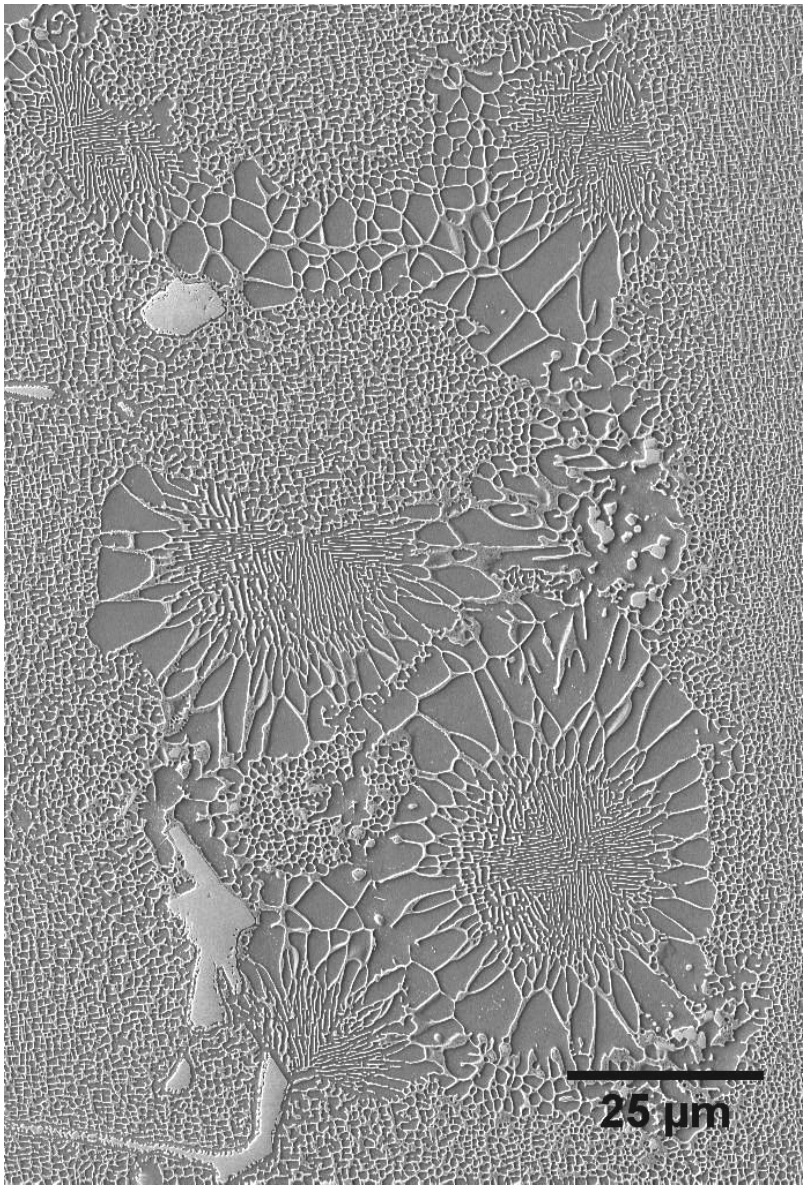


Bimodal distribution of coherent γ'- Ni_3Al particles.



Eutectic-like microstructure of an interdendritic region.

Photos: Mads Aursand