NOMATEN JUNIOR Seminar

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Studying precipitation in Al alloys with transmission electron microscopy (TEM)

Abstract:

Transmission electron microscopy (TEM) is a powerful and versatile tool for characterizing materials at the micro- and nanoscale. Its strength lies in its sub-nanometer resolution and the possibility of detecting multiple, complementary signals simultaneously from the same region. With the advent of new TEM technology coupled with advancement of existing techniques, our understanding of hardening mechanisms in light metals has progressed. For example, by combining Z-contrast atomic resolution high angle annular dark-field scanning TEM (HAADF-STEM) and first principle calculations, the crystal structure of key precipitates in a range of important age-hardenable Al alloys have been determined and verified [1]. The nano-sized precipitates are formed during what is normally the final processing step of age-hardenable Al alloys, known as artificial ageing. The objective of the ageing is to obtain a high number density of fine, semi-coherent precipitates that optimize the dislocation pinning effect, maximizing the hardness of the alloy. In this talk, I will show selected results from my PhD work concerning precipitation in Al alloys.

[1] S. J. Andersen *et al.* Precipitates in aluminum alloys, Advances in Physics: X (2018). DOI: 10.1080/23746149.2018.1479984

Bio:

Elisabeth received her master's degree in physics in 2018 where she studied the effect of pre-deformation and natural ageing on the precipitation in Al-Mg-Si-Cu alloys. After receiving her master degree, she started her PhD work concerning the initial stages of ageing in heat-treatable Al alloys. By combining advanced TEM techniques and various data processing techniques, including both supervised- and unsupervised learning routines, new information about the early stage precipitation in different Al alloys have been revealed.