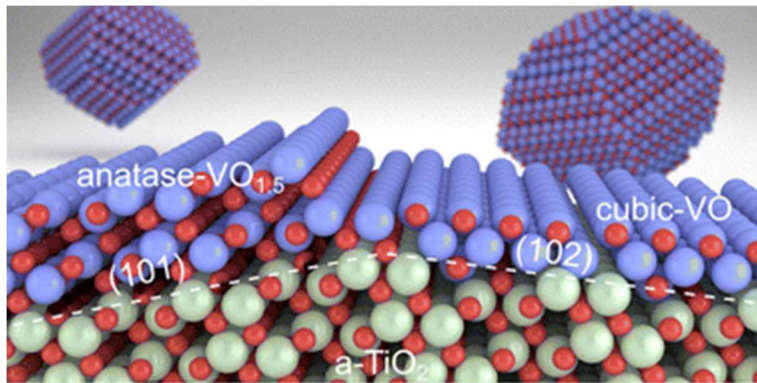


Materials science – Martin Ek's group



Method Tags: nanoscale characterization, electron microscopy

Scientific Tags: catalysis, ceramics, oxidation, combustion

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Martin Ek's group works on nanoscale characterization of materials with applications in e.g. catalysis and machining. The common theme is the study of the materials' surface structures and properties under reactive conditions, whether this is during catalysis of a chemical reaction or for withstanding high temperatures during metal cutting. Advanced characterization by electron microscopy is the core technique used. Master thesis projects in Martin Ek's group are often carried out in collaboration with industry. Specific projects currently available are:

Lime catalyst characterization for polyol synthesis. In collaboration with Perstorp. The project will concern catalyst characterization of different limes that are used in industrial polyol production, to understand their properties in relation to catalyst performance. The thesis work will be mainly carried out at the electron microscopy and nanocharacterization facilities at Lund university, but you will be able to visit and learn about Perstorp, both R&D and production. There is a possibility to apply for a generous scholarship to support costs that may arise, for example travels and lodging related to courses or meetings. If beneficial to the project in terms of equipment, certain experiments could also be performed at Perstorp R&D. Interested candidates can contact Martin Ek or Magnus Johnson (magnus.johnson@perstorp.com) for more information.

Evaluation of sample preparation techniques for compositional analysis of metallic materials. In collaboration with Höganäs and Jernkontoret (<https://www.jernkontoret.se/TO45>). Chemical analysis of steels is often performed by Inductively Coupled Plasma-Optical Emission Spectroscopy (ICP-OES). The challenge with this method is sample preparation to turn the solid metal into a solution of the constituent metal ions without changing their relative abundance; the sample preparation should also preferably be quick and safe. ColdBlock is a newly developed method where the sample is dissolved in acid with controllable heating by IR radiation combined with a cooling block. Before this technique can be adopted by industry it however needs careful evaluation in e.g. precision and detection limits, which is the aim for this thesis project. Visits to other steel manufacturers in Sweden might be included. Jernkontoret will provide a stipend to the student after completing the project. After completing the project you will be an expert user in a technique that will be in high demand from producers of steels and other metallic materials.