Exsolution of metal nanoparticles (KJM/MENA/FYS – BSc/MSc)

Exsolution is a phenomenon where metal nanoparticles segregate from an oxide lattice and remain embedded at the surface. Exsolved nanoparticles show great catalytic activity and long-term stability under operating conditions. They can also be used in electrochemical cells. Nevertheless, there are many open questions regarding the exsolution reaction and growth of the exsolved nanoparticles.

The group has established methodology to study the exsolusion process using transient thermograviemtry of powder samples. This way, activation energies for the metal diffusion that occurs during exsolution can be extracted. The materials and nanoparticles are also characterizaed by XRD and SEM. The metal diffusion can also be modelled atomistically with density field theory (DFT) calculation. The MSc project and main methods can be adjusted according to the motivations of the student.

The MSc project will be integrated as a part of SOLARIS, and with possiblity for close collaboration with on-going PhD (Andreas Rosnes) and postdoc . The project can therefore also include thin films prepared by combinatorial PLD and associated spatial high-throughput characterization and analysis.

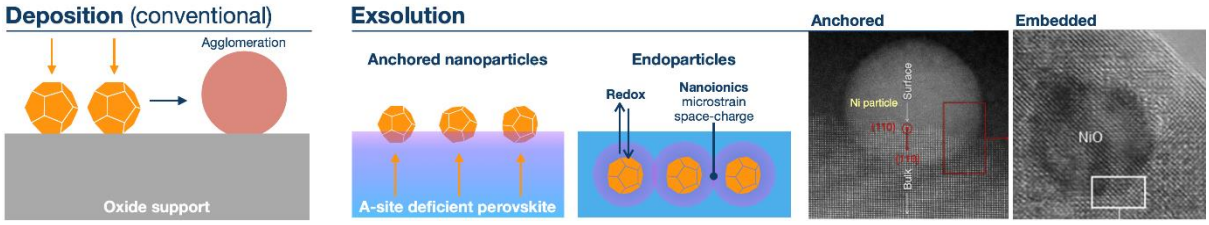

Figure 1: Schematic illustration of deposited metal nanoparticles (orange) that agglomerate (left), anchored nanoparticles and embedded endoparticles formed by exsolution (middle), and TEM cross-section images (right).