Title:

Tuning the shell thickness in Au@Metal-Oxide core@shell particles

Abstract, if applicable figure (max. 2000 characters)**:**

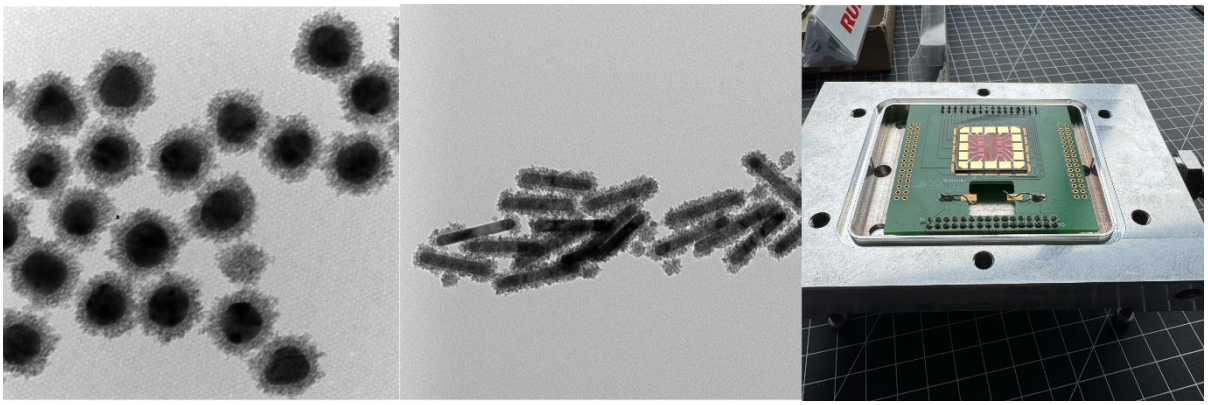
Understanding how complex nanosystems are formed is crucial for their usage in future applications in many different fields. So far, these processes have only been partially understood, and further research is required to fully discover how the formation and growth of these systems work.

This research topic will be focused on synthesis and characterization of core@shell nanoparticles of different shapes and dimensions. The student will be introduced to several nanoparticle synthesis methods, with the aim of understanding how these particles growth and how to finely control it.

We will produce different particle systems with different shell thicknesses, trying to make the method solid and reproducible.

The particles will be used as gas sensing materials. Thick homogeneous films will be deposited on microstructures electrodes to produce working devices.

By working on this project, the student will first get familiar with syntheses of different types of hybrid nanomaterials, followed by advanced structural characterization techniques (TEM, SEM, UV-Vis, DLS, AFM, etc..). The student will also learn how to produce homogeneous films with different techniques.



Supervisor:

Skills that you should already have:

- Advanced knowledge in colloidal chemistry
- Knowledge of basic lab equipment
- Independent work in chemical lab
- Good communication skills

Skills that you will acquire during the internship:

- Deep understanding of colloidal synthesis
- Usage of optical and electron microscopy (TEM, SEM, AFM)
- Usage of characterization techniques (UV-Vis, DLS, TGA)
- Experience with different deposition techniques

- Programming skills with Python for data analysis

Dual-use /export control relevance:

This project is considered fundamental science and hence not object of dual use research of concern or foreign trade laws. If a transduction principle or device architecture matures to a point where it might become subject to application focused development of a novel type of sensing device for specific gases and vapors, safety-related aspects will be re-evaluated, specifically taking into account the current German and EU dual use regulations.