

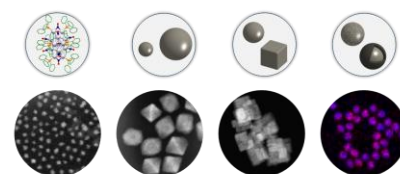
## Thesis (Bachelor- / Master- / Vertieferarbeit)

# Synthesis of mono- und bimetallic nanoparticles and clusters for catalytic applications in emission control

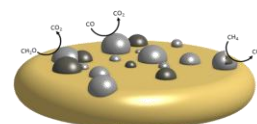
### Motivation:

More than 60 percent of the precious metals produced worldwide are used in catalytic processes. However, due to their scarcity in the Earth's crust and their high cost, there is an urgent need to minimise their content in high-performance catalysts. Conventional catalyst synthesis methods make it difficult to achieve sufficient control over catalyst parameters such as metal particle size, composition and loading. We synthesise monodisperse noble metal nanoparticles and clusters (e.g. Pd, Pt, Ru and Rh), which are then used as starting compounds for the production of defined model catalysts. This allows us to investigate structure-activity relationships of catalysts in the field of emission control, with the aim of developing high-performance catalysts.

Synthesis of defined nanoparticles and clusters



Development of model catalysts



### Current research topic:

We develop and investigate catalysts in the field of emission control. Among other things, theses on the following topics are currently available:

- Synthesis and characterization of mono-/multimetallic clusters as starting compounds for catalysts,
- Synthesis and characterization of multimetallic complexes and nanoparticles for the production of model catalysts,
- Synthesis and characterization of size-selective, shape-anisotropic metal oxide nanoparticles and investigation of structure-activity relationships in emission control.

### Anforderungsprofil:

- Interest in inorganic chemistry in combination with heterogeneous catalysis, as well as knowledge of the basic techniques of inorganic synthesis,
- Independent and meticulous approach to work

### We offer:

We offer excellent opportunities to learn about the synthesis of nanoparticles and cluster compounds and to gain practical experience in characterizing these materials and producing catalysts.

You can start your thesis at any time. If you are interested in one of the topics or have any questions, please feel free to contact Nicola Da Roit ([nicola.roit@kit.edu](mailto:nicola.roit@kit.edu)).