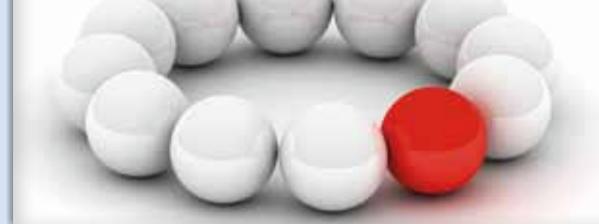


# Landesforschungsschwerpunkt Nanostructured Catalysts



**Landesforschungsschwerpunkt at the TU Kaiserslautern; established in august 2008; twelve groups with about 25 co-workers who are directly engaged in NanoKat projects; over-all there are about 100 co-workers employed in the participating groups; performance data for 2008: third-party funds: ca. 5.2 Mio €, number of scientific publications: 115; core competences: synthesis and characterization of catalytically active particles, functionalisation of particles, chemical engineering, application of nanostructured catalysts in chemistry and bioengineering; all methods and technical equipment which are necessary for performing the scientific investigations related to NanoKat are available on the campus of TU Kaiserslautern.**

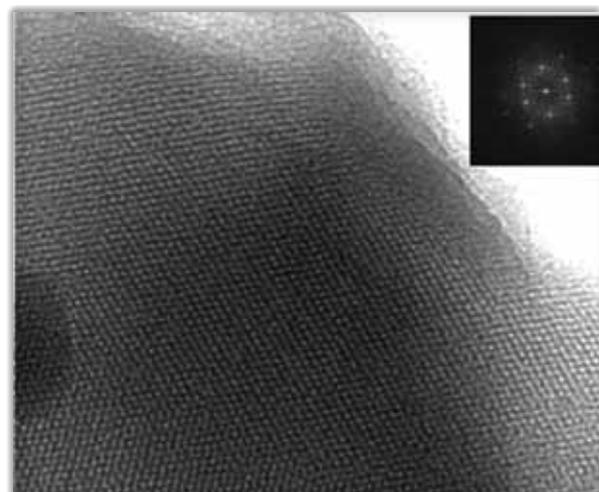
In NanoKat, novel nanostructured catalysts are synthesized and characterized, their catalytic activity and some relevant applications are investigated. This is done with a special focus on the usage of renewable resources as the substrates for catalytic reactions. To realize this project, twelve groups from the departments of Chemistry, Engineering and Physics have joined.

Catalysis allows to perform chemical reactions under mild conditions and under complete control of selectivity. Thus the undesired formation of side products can be suppressed. This is of decisive importance for an economically and ecologically efficient production of chemicals. Therefore, almost each final product coming from the chemical industry is made by usage of catalytic transformations.

Heterogeneous catalysis is characterized by the fact that catalyst and the substrate are separated by a phase interface, e.g. a solid catalyst and a gas as the substrate. By implementation of nanostructured heterogeneous catalysts, the diffusion pathways of substrates and reaction products become short. This will reduce the limiting influence of the mass transport on the overall reaction rate and increase the conversion of the substrate as compared to classical heterogeneous catalysts. This fact is of special importance when renewable resources are used as substrates. Such compounds are generally sensitive to the temperature. Nanostructured catalysts in turn allow to decrease the reaction temperature. For the generation of nanostructured catalysts the morphology of the material and the chemical nature of its surface have to be designed and characterized. This is one of the central areas of research which is investigated in NanoKat. The separation of the catalysts from the products can either be performed by nano filtration, centrifugation, induced agglomeration or by means of magnetic separation. This allows the simple re-usage of the catalysts which often are made out of high price noble metals.

In NanoKat we follow up a complete chain of development starting by fundamental research and leading to product oriented processes. The work that is done in NanoKat provides the basis for the set-up of two Transregio-SFBs, one in collaboration with colleagues of the Univ. des Saarlandes together with the Karlsruhe Institute of Technology) which have recently been filed to the DFG. Furthermore, there are a series of co-operations with the Forschungszentrum OPTIMAS due to a pronounced overlap of our goals in material sciences.

The Landesschwerpunkt NanoKat is included in a network of national and international collaborations. We have scientific contact to a whole series of universities and research facilities. Due to the high impact of application-oriented groups gathered in NanoKat there are also strong collaborations with the industry.



Transmission electron microscopy image of a mesoporous nanostructured catalyst

## Contact



### Landesforschungsschwerpunkt Nanostrukturierte Katalysatoren

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## Research Areas

- synthesis and characterization of catalytically active particles
- functionalisation of particles
- chemical engineering
- application of nanostructured catalysts in chemistry and bioengineering

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