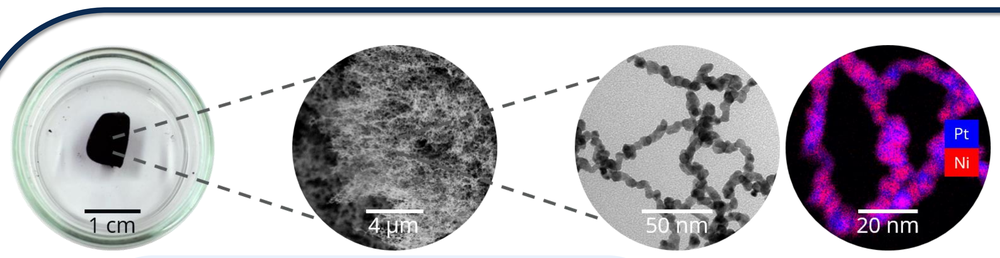
TECHNISCHE UNIVERSITÄT DRESDEN

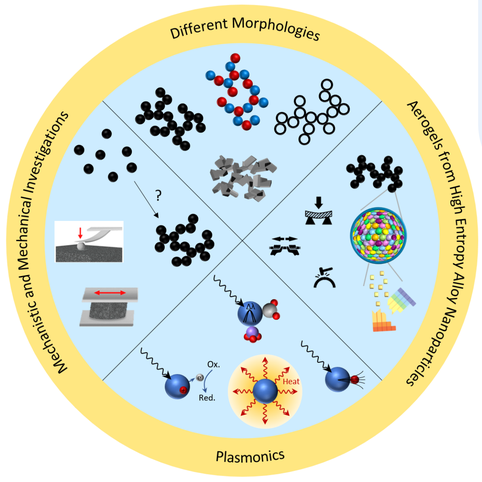
PHYSICAL CHEMISTRY
EYCHMÜLLER GROUP

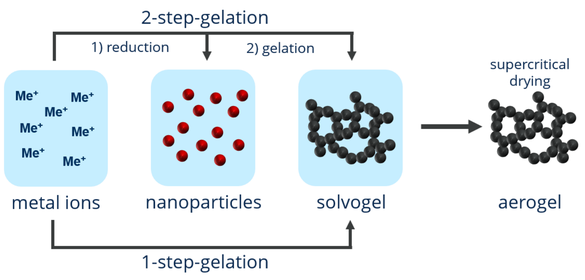
Mathematics and Science | Faculty of Chemistry and Food Chemistry | Physical Chemistry



Aerogels ... what?

Metal aerogels are solid, nanostructured networks that contain a lot of air (up to 95 %). They can be imagined as metal sponges, which are composed of pores and building blocks in the nanometer sized regime.

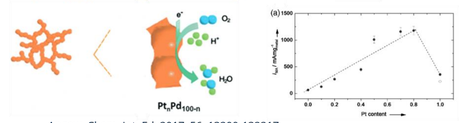




What are they good for?

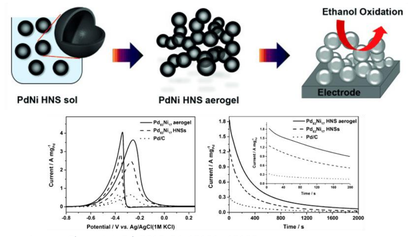
Due to their unique properties, they can be used in the future to increase the efficiency and long-term stability of fuel cells. Another approach is to use them as catalysts, for example for the conversion of CO_2 to usable basic chemicals.

Pt_nPd_{100-n} Aerogels for Oxygen Reduction Reaction

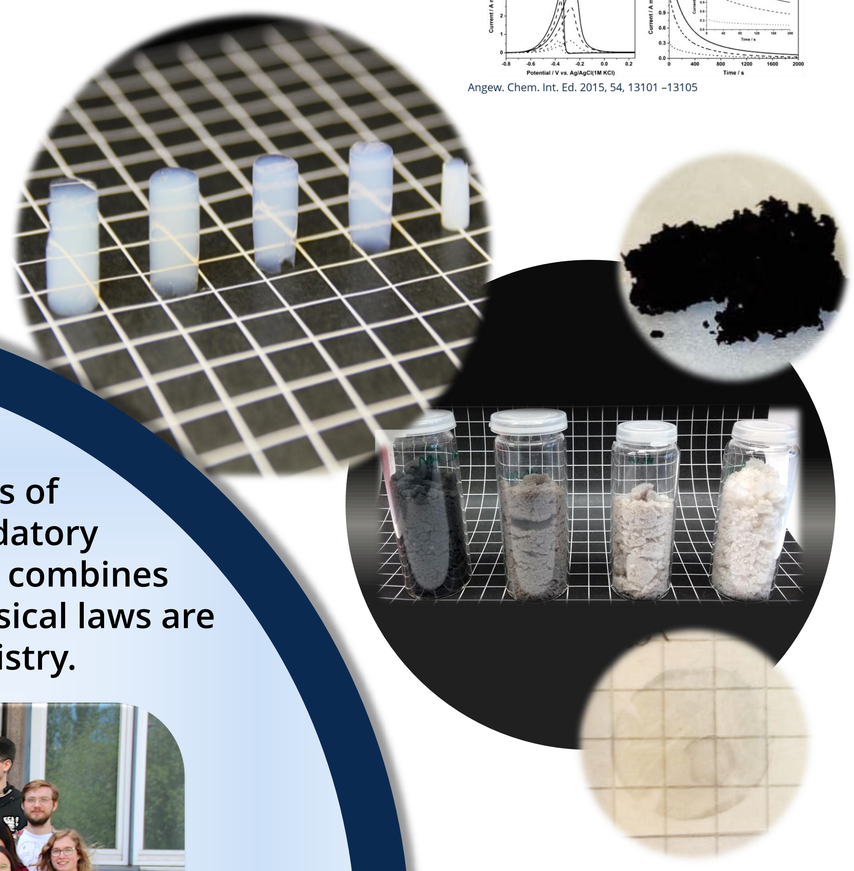


Angew. Chem. Int. Ed. 2017, 56, 13200-132217

PdNi Hollow Aerogels for EtOH Oxidation

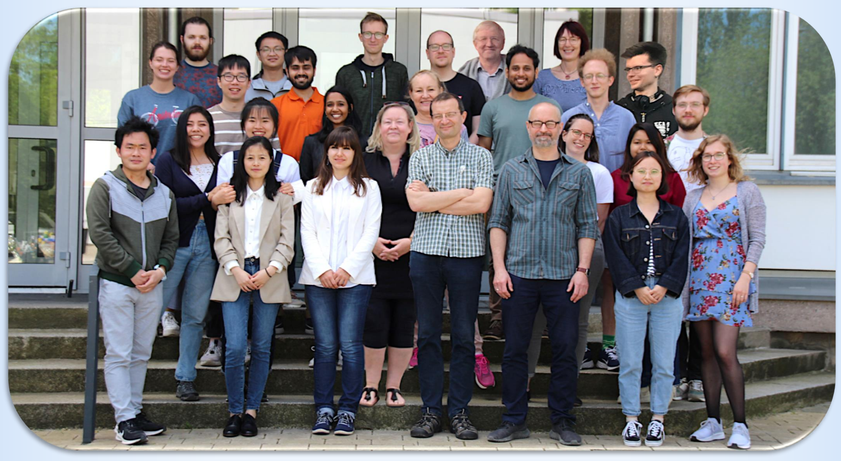


Angew. Chem. Int. Ed. 2015, 54, 13101 –13105



AEROGELS

Physical Chemistry (PC) is one of the fundamental areas of chemistry and is part of the mandatory program in every chemistry degree. It combines chemistry and physics, whereby the physical laws are investigated on objects of chemistry.

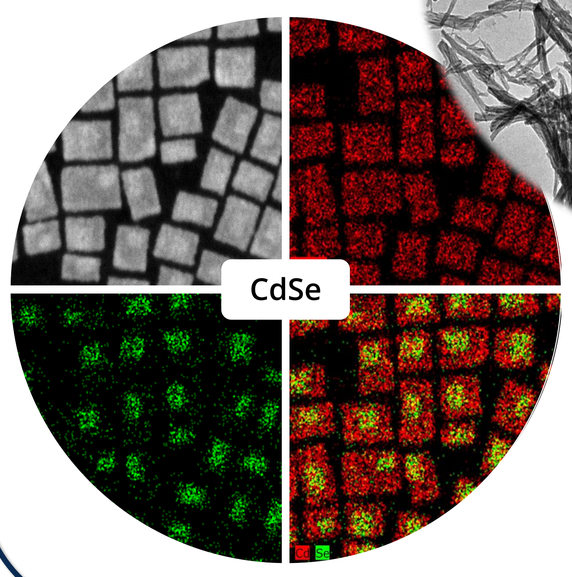


Prof. Dr. Alexander Eychmüller is leading the research group of "Physical Chemistry" at TU Dresden since 2005. Our focus is on the development, synthesis and characterization of novel nanoparticles and aerogels with the aim to use them later for various applications, such as catalysts or electronic devices.

NANOPARTICLES

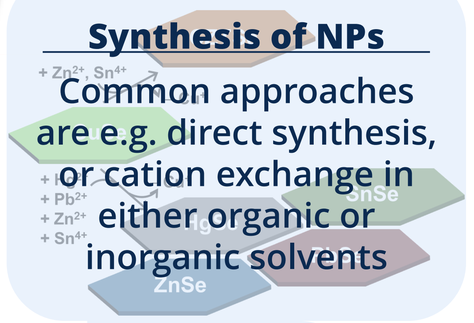
By the way ...what are nanoparticles?

Nanoparticles (NPs) are materials with at least one dimension in the nanoscale (10^{-9} m). They have unique chemical and physical properties that can be tuned synthetically by their size, shape and composition. In our group, especially metal semiconductor NPs are in the focus.



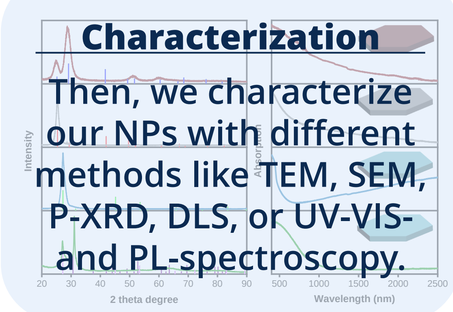
Synthesis of NPs

Common approaches are e.g. direct synthesis, or cation exchange in either organic or inorganic solvents



Characterization

Then, we characterize our NPs with different methods like TEM, SEM, P-XRD, DLS, or UV-VIS- and PL-spectroscopy.



Assembly

Monolayer, stacked, or randomly arranged – NPs have to be assembled to enhance their properties.

Application

Our aim is to use our NPs for example in novel solar cells, sensors, electronic devices, or photodetectors.

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