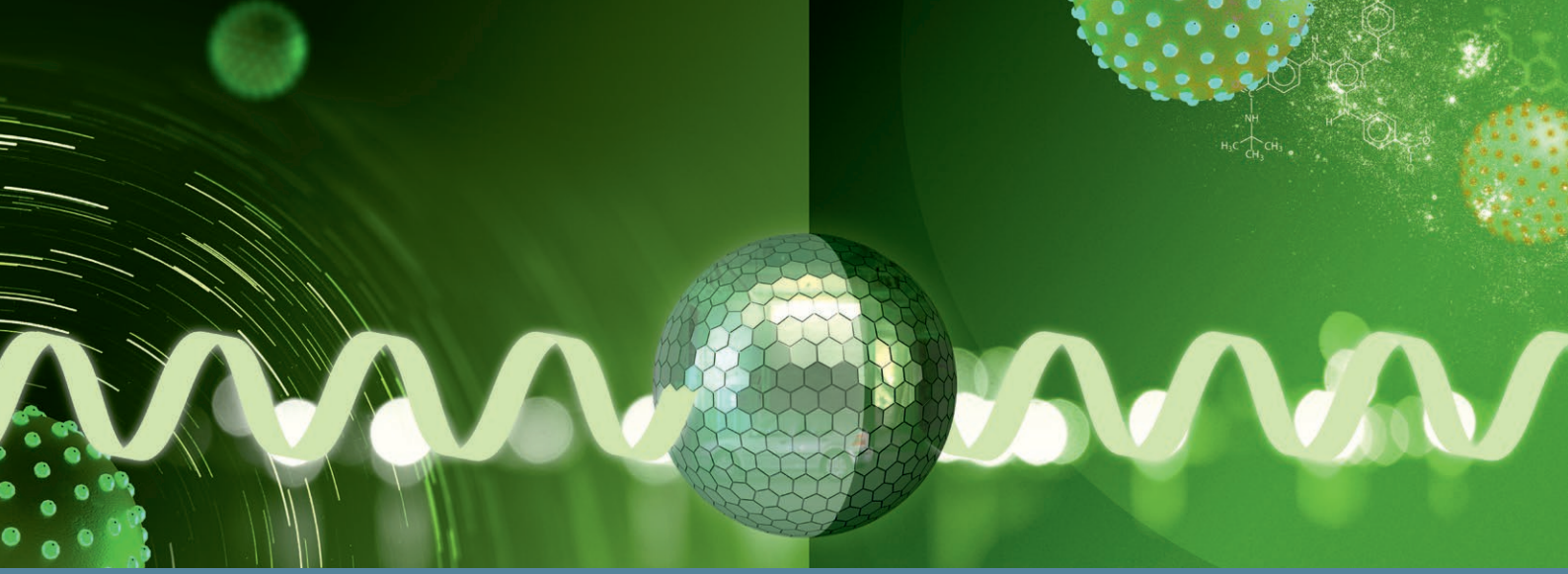


pades | project 6

Resonant Metallic Nano Particles – Plasmonic Exhaust Gas Catalysis

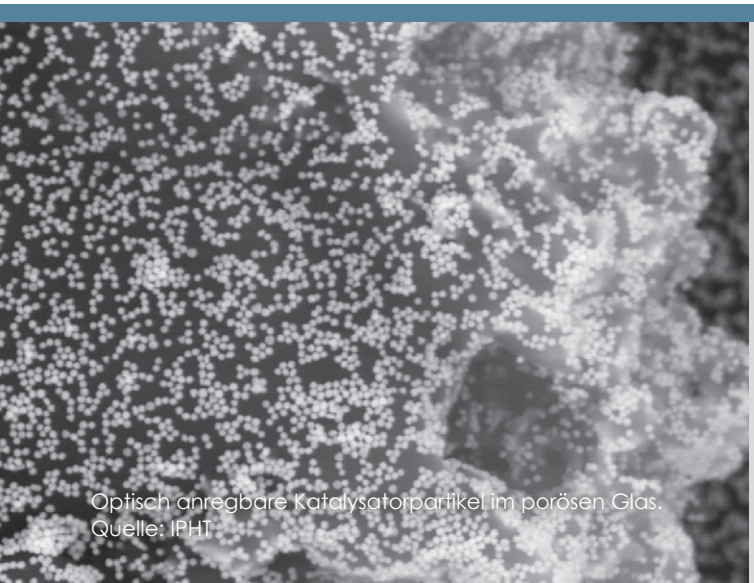
The utilization of catalytic processes for exhaust gas purification is state of the art. However, processes with unspecific emissions, fluctuating contaminant concentrations or compositions, and processes involving odorous substances are problematic. Fluctuating contaminant concentrations require the selected treatment method to be flexible in terms of adjustable process conditions for continuous processes or the utilization of technologies for interim adsorption of the contaminants.

Pades develops and manufactures catalytic exhaust gas purification systems that do not operate on the basis of energy-consuming thermal activation of the catalyst any more, but use optical (or to be more exact: plasmonic) activation. Such »switchable« catalysts are made possible by using suitable light sources and adapted catalyst nano particles disposed on the surface of a porous, optically transparent matrix having a hierarchical pore structure.

For the first time, the catalytic decomposition of contaminants with low or fluctuating concentrations has been made possible.

In order to achieve this, we have, on the one hand, developed a method for the synthesis of plasmonically excitable metal nano particles with adjustable primary particle sizes of 10–100 nm, and, on the other hand, established a method for fixing these particles on optically transparent, hierarchically structured carrier materials (porous glass).

At the moment, we are working on technological solutions for constructing conventional exhaust gas purification systems in a way that such systems are also capable of operating using plasmonic activation in the future, thus reducing the temperature required for catalytic reactions significantly. This reduces operating costs, investment costs and the impact on the environment.



Optisch anregbare Katalysatorpartikel im porösen Glas.
Quelle: IPHT

Our range of products:

- Synthesis methods for producing plasmonically excitable metal nano particles with adjustable primary particle sizes of 10–100 nm
- Porous glass with a defined hierarchical pore structure
- Metal nano particle catalyst systems
- Systems for the photochemical decomposition of gaseous contaminants with a low concentration in process gases that operate on the basis of photo catalysts

pades | project partner

Alliance for Innovative Exhaust Gas Purification

The following partners offer technologies and materials for the photochemical decomposition of gaseous contaminants with a low concentration in process gases:

Jenoptik KATASORB GMBH is an expert in the field of catalysis and sells both components such as catalysts and complete catalytic systems. Continuous improvement of the technologies and catalysts allows us to flexibly respond to customer requirements and to offer tailor-made solutions in different application fields.

Boraident GmbH is a supplier for laser marking, identification, and sensor systems for glass and software-based integration into an automated production line. We understand glass and its peculiarities as challenges for our daily work. We develop these solutions in different business segments and turn them into high-performance products.

The **Institut für Photonische Technologien e.V. (IPHT)** (Institute for Photonic Technologies) performs fundamental research on photonic methods and systems of the highest sensitivity, efficiency, and resolution. In accordance with its mission, »Photonics for life – from ideas to instruments«, scientists at IPHT develop customized solutions of problems in life, environmental sciences, and medicine. Three research fields – biophotonics, fiber optics and photonic detection – are in the focus of IPHT's research and development.

The **Institute for technical and environmental chemistry (ITUC) at Friedrich-Schiller-Universität Jena** deals with the key aspects energy storage and transformation, catalysis, mechanochemistry, cavitation and green engineering in research and education. In addition to the basic research, the transfer and the application of knowledge to solve environmental issues is in the foreground of our work. The institute is working successfully on a wide range of processes like catalytic afterburning, energy storage from renewable sources and waste water treatment.

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