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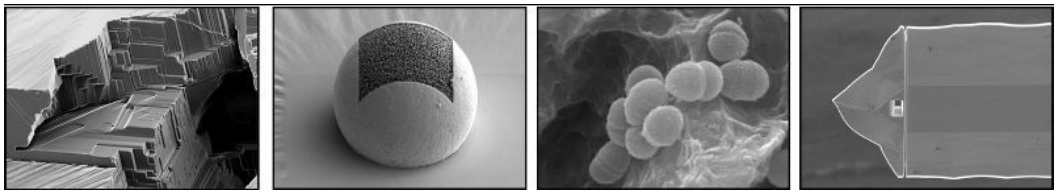
University of Basel
Swiss Nanoscience Institute

Swiss Nanoscience Institute
Exzellenzzentrum
der Universität Basel und
des Kantons Aargau

NANO IMAGING LAB

Newsletter

November 4, 2025



Our latest contribution to research: "Spark ablation metal nanoparticles and coating on TiO_2 in the aerosol phase"

Generation and characterisation of metal nanoparticles (NPs) in the aerosol phase have gained attention in recent years due to their significant potential in applications as diverse as catalysis, electronics or energy storage. Despite the high interest in NPs, it remains challenging to obtain detailed quantitative information with conventional aerosol analysis instruments on size, number concentration, coagulation behaviour and morphologies, which are key to understand their properties. In this study Benjamin Gfeller from the Department of Environmental Sciences at the University of Basel, generated NPs from four metals - Au, Pt, Cu and Ni - via spark ablation in the aerosol phase, which allows the production of NPs as small as 1 nm in high quantities and purity. At this point the Nano Imaging Lab was of great help to characterise the generated particles with transmission electron microscopy (TEM) and scanning transmission electron microscopy (STEM) in combination with energy-dispersive X-ray spectroscopy (EDX).

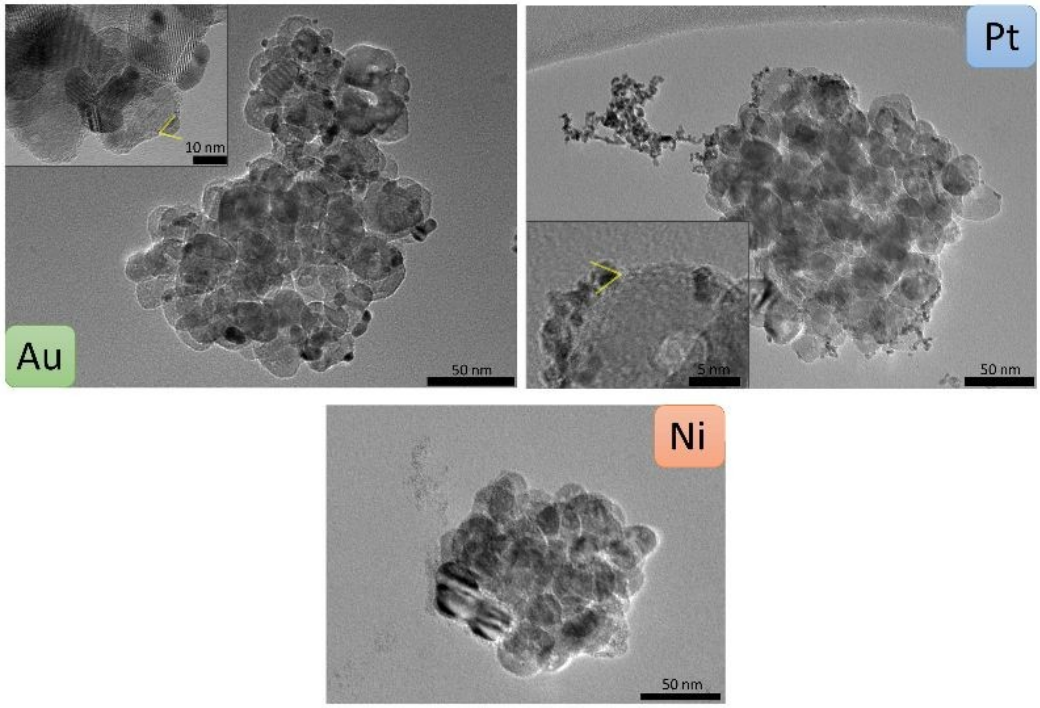
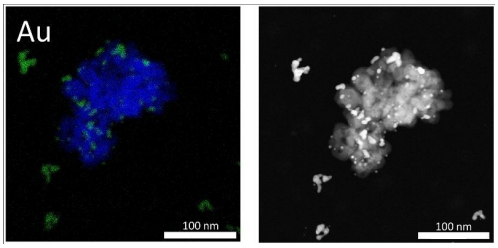
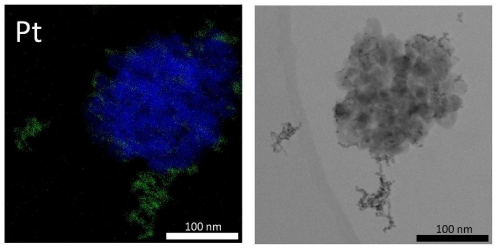


Abb1: TEM micrographs of TiO_2 substrate particles coated with Au, Pt or Ni NPs. Au and Pt NPs correspond to the small darker structures mainly visible at the edges of the substrate. Ni NP coating appears brighter than the substrate and is only visible on the left edge of the substrate particle. Insets for Au and Pt provide details on individual primary particles and small agglomerates as well as indicated contact angles.

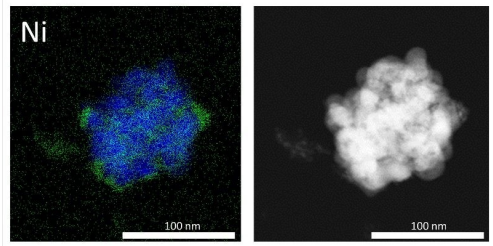
The four NPs were also coagulated with larger TiO_2 NPs of about 120nm size. In order to further analyse these coated aerosol particles, lamellas were prepared from a film of metal Np-coated TiO_2, using a FEI Helios NanoLab 650 DualBeam. These TEM lamellas with a sample thickness below 75nm were imaged and analysed in the JEM-F200 cFEG.
This detailed characterisation of NPs mixtures will be essential for a fundamental understanding of spark-ablation-generated particles and their applications for material sciences.



TiO_2 substrate particles coated with Au.



TiO_2 substrate particles coated with Pt.



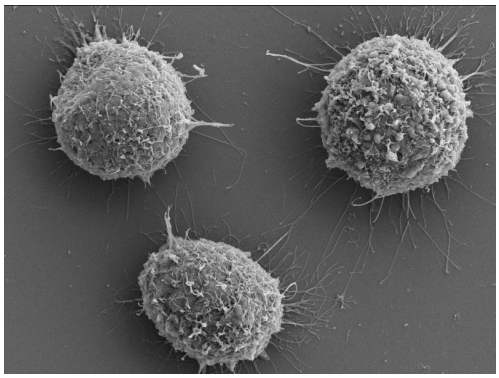
TiO_2 substrate particles coated with Pt.

Abb2: STEM–EDX spectral mappings (TiO_2: blue, coating metals: green) and STEM micrographs (black and white).

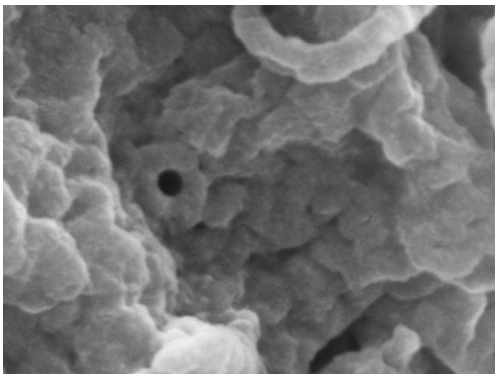
(Benjamin Gfeller, Mariia Becker, Nicolas Bukowiecki, Adrian Dario Aebi, **Marcus Wyss**, Markus Kalberer **Spark Ablation Generation of Metal Nanoparticles and Coating on TiO_2 in the Aerosol Phase** Aerosol Research, 3, 351–369 (2025),https://ar.copernicus.org/articles/3/351/2025/)

Blockcourse Structural Biology and Biophysics HS 2025

In order to full fill their teaching assignment, every September the Nano Imaging Lab hosts students of Structural Biology in their labs. During these four weeks of block course, small groups of 4 students always spend one afternoon in the NI-Lab to get an introduction into electron microscopy. This year 63 students earned insights into Scanning Electron Microscopy (SEM) and were enabled to image Cell Nuclei and the Nuclear Pore Complexes by themselves, which was the overall subject of this years course.



Nuclei of HeLa cells.



Nuclear Pore Complex.

Students very much appreciated the possibility to experience hands on work on the microscopes and the instructors were content with the outcome of the results.

The Nano Imaging Lab visited the Dreiländertagung MC2025 in Karlruhe

Once a year the members of the Nano Imaging Lab attend a Microscopy Conference in order to learn about new techniques, applications and technologies in their field and also reunite with longtime aquaintances and collaborators. This year the Dreiländertagung was held in Karlsruhe from August 31 to

September 4, 2025.

Not only fascinating talks, meaningfull discussions with the exhibitors and interesting poster presentations were on the agenda, but also networking events at extraordinary locations of Karlsruhe.

As a pleasant item on the agenda Marcus and Susanne were invited to visit the lab of their new collaborator Prof.Dr. Andrea Schäfer, leader of the Institute for Advanced Membrane Technology (IAMT) at the Technical University of Karlsruhe (KIT). Dedicating her work to provide pure water to everyone, Andrea and her team eagerly work on designing cutting-edge membrane technology in order to purify water from even micropollutants i.e. steroid hormones or other organic molecules.

Dr. Minh Nguyen gave them an elaborate tour through the labs so that the gain of insight made the subsequent discussion about their projected joint publication even more fruitful.

Symposium of NANOscientific Forum Europe in Orsay, France

Marcus and Monica also decided to attend the NANOscientific Symposium 2025 for the first time. Organised by the NANOscientific Forum Europe this symposium took place from September 17 to September 19, 2025 at the Laboratory of Solid State Physics (LPS),

located in Orsay, France, approximately 25 km southwest of Paris. The LPS is a research institute of Paris-Saclay University, affiliated with the National Center for Scientific Research (CNRS) as a joint research unit (UMR 8502).

The scientific focus included Magnetic Force Microscopy and 2D Materials, as well as new developments and innovative methods in nanotechnology and correlative microscopy.
Beyond scientific discussions the event offered participants many networking opportunities, such as the conference dinner on a scenic Seine river cruise and the social event at a local winery.

Networking with Prof. Dr. Lukas M. Eng from TU Dresden.

We are welcoming our new group member Fabian Frei

Fabian accomplishes the Nano Imaging team as IT specialist and will foster our administration tool, which needs regular updating, enhancement and improvement. We are extremely happy to have him with us.
Welcome Fabian!
