



University
of Basel

Swiss Nanoscience Institute

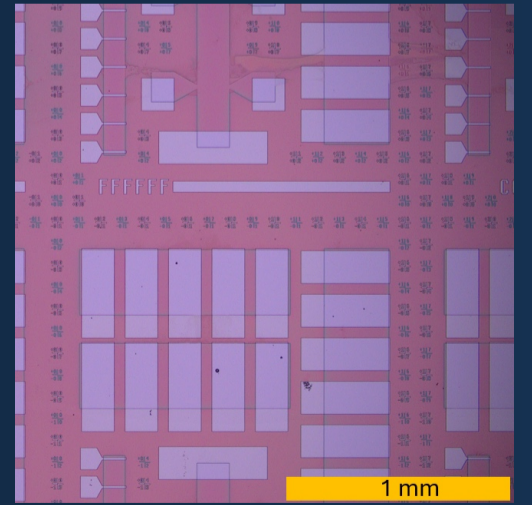
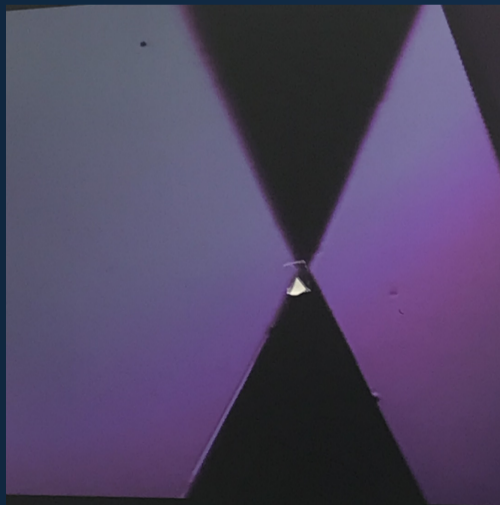
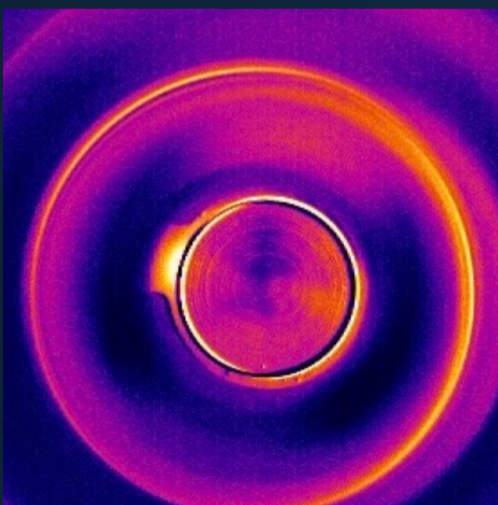
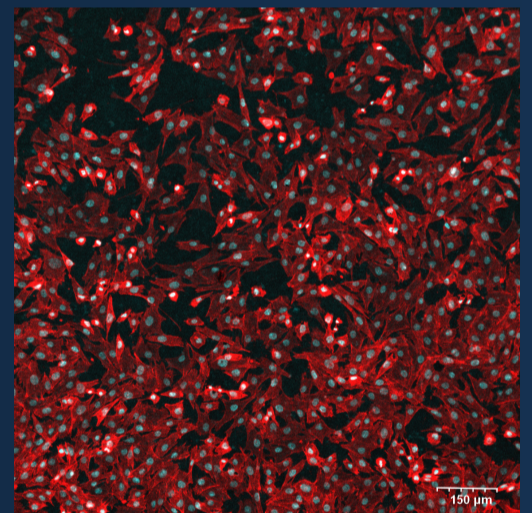
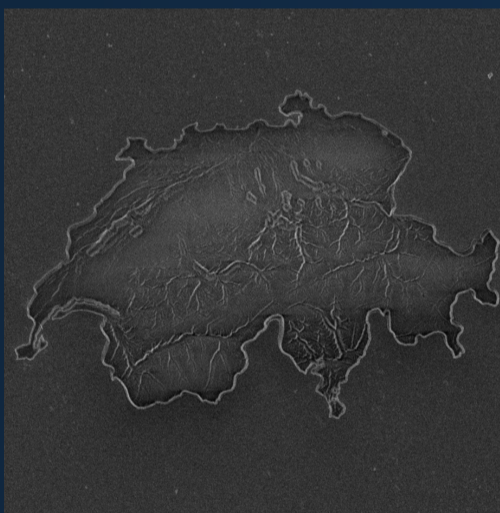
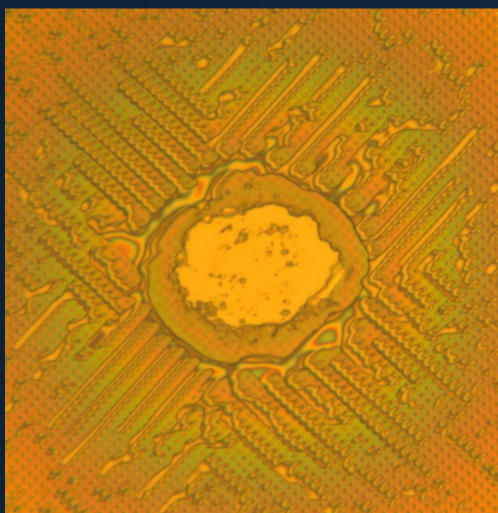


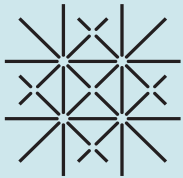
Swiss Nanoscience Institute
Center of Excellence supported
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and the Canton of Aargau

Small Talk

13. Mai 2026

Klingelbergstrasse 82, 4056 Basel
Physik Mensa; 8:30 - 14:00





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8:30 - 8:50

Registration

8:50 - 8:55

Introduction

Anja Car

9:00 - 9:15

Single-Molecule FRET Analysis of
Holliday Junction Dynamics under varying
MgCl₂ Concentrations and Temperature

Tim Tschanz

9:15 - 9:30

Towards Single Cell Proteomics

Ronja Salathé

9:30 - 9:45

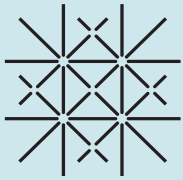
Autoclave and Surfactant-Assisted Synthesis
of Nanocrystals

Laurine Haller

9:45 - 10:00

Function Analysis of Femtosecond Lasers,
Confocal Microscopy and Optical Coherence
Tomography

Yanick Hasler



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10:00 - 10:15

Nanoparticles for Catalysis of CO₂ Reduction

Christoph Schmidt

10:15 - 12:00

**Poster Pitches
and Poster Session**

Lunch Break (60 min.)

13:00 - 14:00

Closing Remarks and Awards

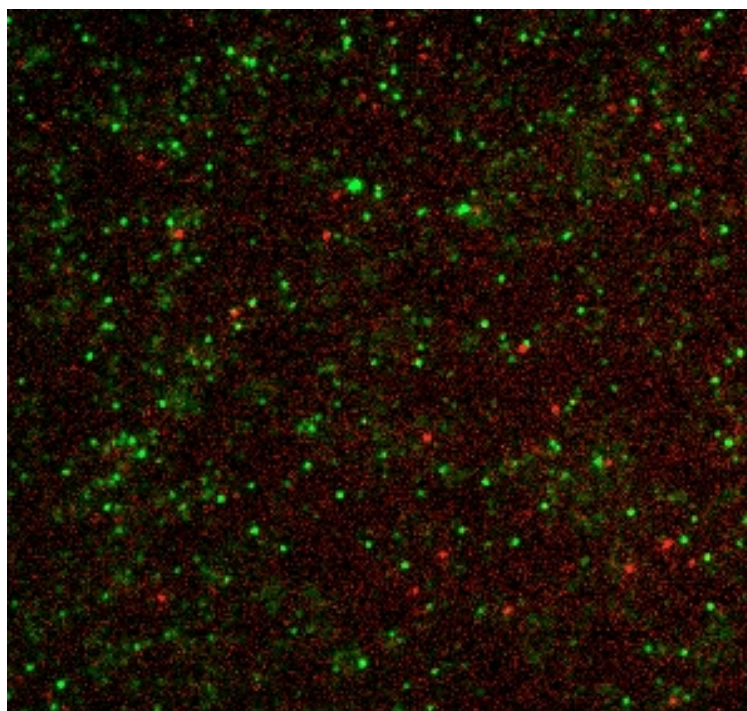
Prof. Martino Poggio

Single-molecule FRET analysis of Holliday Junction dynamics under varying MgCl_2 concentrations and temperatures

Tim Tschanz

9:00 - 9:15

Fluorescence resonance energy transfer (FRET) can be used to study interconversion dynamics by attaching fluorophores to a molecule. The excitation efficiency of the acceptor fluorophore by a donor fluorophore scales inversely to the sixth power of the distance between them and is therefore extremely sensitive to changes in the conformation of the investigated molecule. The emission of the acceptor after it was excited by the emission of the donor fluorophore is called the FRET signal. Here, the FRET signal of modified DNA Holliday junctions is used to examine its behavior at different concentrations of magnesium chloride (MgCl_2). A 50 mM and 200 mM MgCl_2 solution were used to study the interconversion dynamics of Holliday junctions.



Towards Single Cell Proteomics

Ronja Salathé

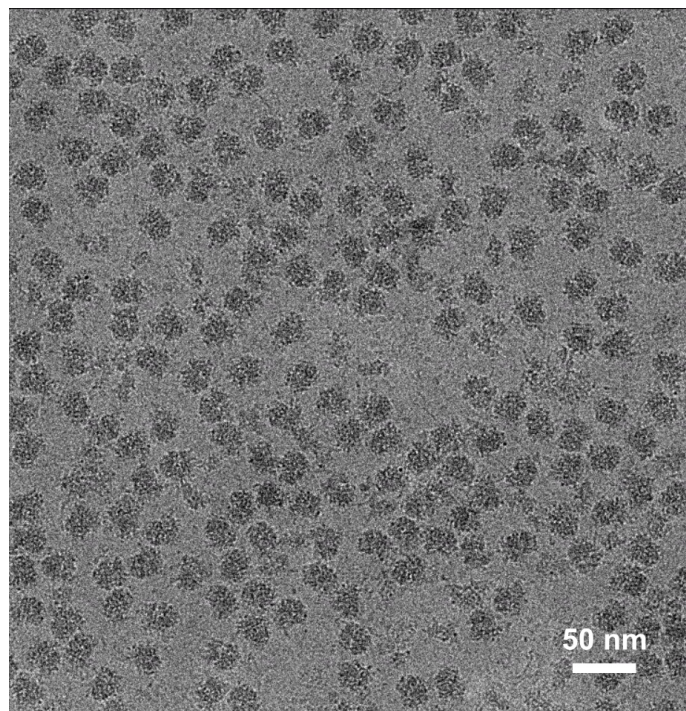
9:15 - 9:30

This work focused on experimental approaches to study the Parkinson's disease-related protein alpha-synuclein (α -syn). Understanding the structure and aggregation behavior of α -syn is essential for gaining insight into the molecular mechanisms underlying neurodegenerative diseases.

A central part of the project was cryo-electron microscopy (cryo-EM), including sample preparation using the CryoWrite platform, data acquisition, and subsequent image processing. These techniques enable high-resolution structural characterization of protein assemblies.

In addition, complementary methods such as reverse phase protein arrays were used to analyse fluorescence signals of proteins and antibodies. Selected aspects of sensor programming with a microcontroller further provided insight into the technical principles of experimental instrumentation.

Overall, the course combined advanced imaging techniques with supporting analytical and technical methods to investigate disease-relevant proteins.



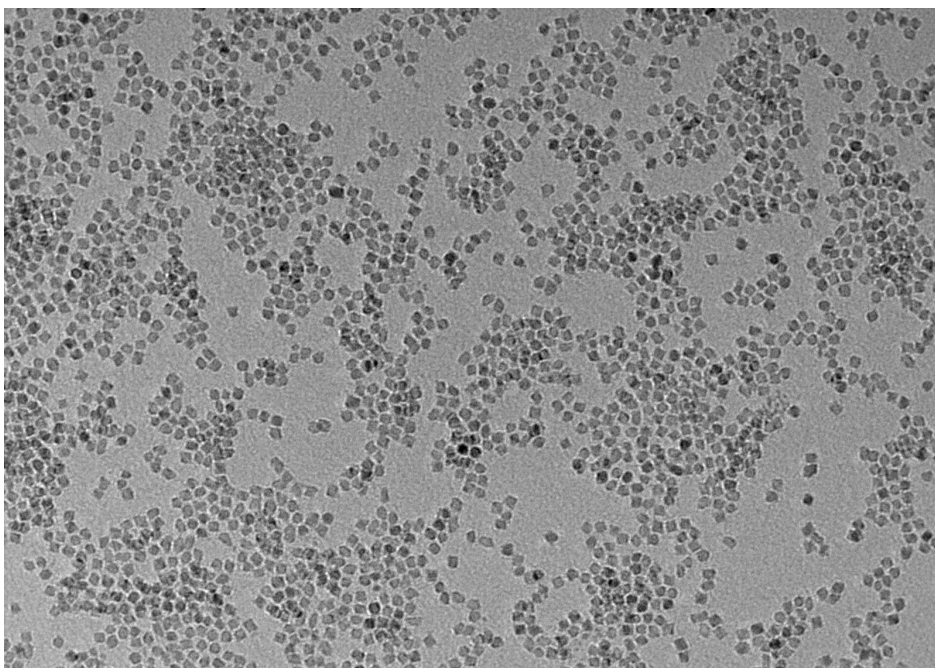
Autoclave and Surfactant-Assisted Synthesis of Nanocrystals

Laurine Haller

9:30 - 9:45

Nanocrystals (NCs) are nanoscale hybrid particles composed of an inorganic crystalline core that is stabilised by organic ligands. In this work, group IV metals were used to synthesise colloidal NCs by two different approaches. HfO₂ and 5% Tb-doped HfO₂ NCs functionalised with MEEAA were synthesised via a solvothermal autoclave method, while ZrO₂ and ZrO₂ with HfO₂ core shell NCs were made via TOPO-assisted synthesis.

The colloidal stability and crystalline growth were investigated for all samples. Further, the NCs were characterised using NMR spectroscopy, while TEM imaging provided information about the NCs morphology, diameters and the thickness of the HfO₂ shell on the ZrO₂ core.



Function Analysis of Femtosecond Lasers, Confocal Microscopy and Optical Coherence Tomography

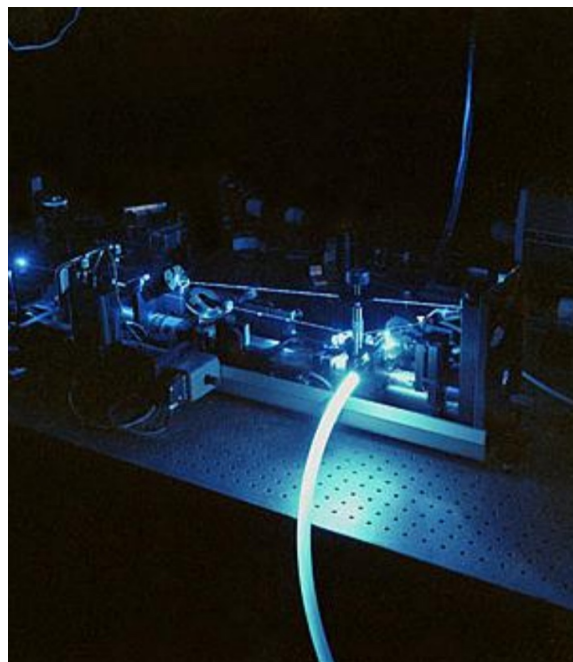
Yannik Hasler

9:45 - 10:00

Lasers are an integral part of many tools in science, industry and our everyday lives. Their properties are monochromaticity, very high coherence and low divergence, which is measured in the kilometer range, and high intensity of light, which makes it possible to focus a lot of energy onto small areas.

Optical microscopy as a concept is older than lasers, also has a broad array of applications, but quickly reaches its limits when it comes to imaging at a certain depth of a sample. This is where Optical Coherence Tomography (OCT) is preferred, as it produces a high-resolution scan that reaches into the sample. It's non-invasive, so it can also be applied in medical and biological fields, on top of (sb) surface- and material analysis.

3D Laser Scanning Confocal Microscopy shines by providing very high resolutions of surfaces, which is helpful to analyze surfaces and overview LASER machining and milling.

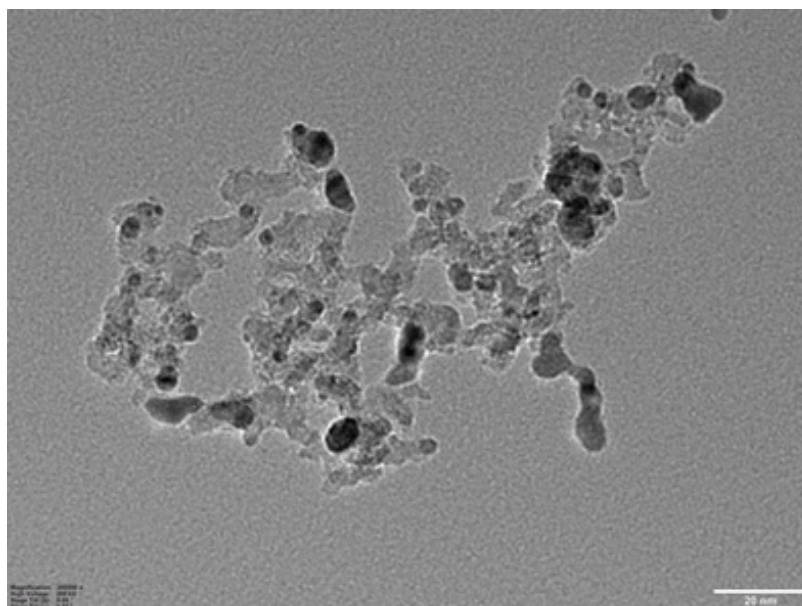


Nanoparticles for Catalysis of CO₂ Reduction

Christoph Schmidt

10:00 - 10:15

Novel approaches to fuel a growing demand for energy are needed to decrease carbon dioxide (CO₂) emissions in an effort to limit global warming. Schottky Barriers at the metal-semiconductor interface of gold-loaded Titanium Dioxide (TiO₂/Au) nanoparticles trap photoexcited electrons in the metal serving as an electron donor in the reduction of CO₂ to methane (CH₄). This project investigated the production of these nanoparticle photocatalysts and how their catalytic activity differed with varying production routes and dimensions. Commercially available TiO₂ powder enabled the reduction after being doped with Au while spark-ablated Ti nanoparticles, oxidized and doped with Au, led to no measurable reduction. This discrepancy is likely due to smaller dimensions of spark-ablated particles, resulting in a wider bandgap and limited light absorption. Optimization of the reaction could lay the foundation for a carbon neutral energy cycle, sustaining current fuel infrastructure.



Poster List

- P1: Effect of PEG-Lipid Chain Length on the Transfection Efficiency of Lipid Nanoparticles, Tim Tschanz
- P2: Cell-Material Interactions and Tissue Engineering, Ronja Salathé
- P3: Biocompatibility of Surface Modified Titanium Discs for Implant Application, Laurine Haller
- P4: Fabrication of PdGe-based Ohmic Contacts for low Temperature Usage, Yanick Hasler
- P5: Engineering of Pyrenoid Linker Proteins in *Chlamydomonas reinhardtii* for CO₂ Fixation, Christoph Schmidt