



Artificial photosynthesis at sub-zero temperatures within cryo-protective lipidic mesophase nanoconfinement (P2406)

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Level of employment / date of entry:

100% position for 4 years, earliest starting date: 1 January 2025

The Swiss Nanoscience Institute (SNI) at the University of Basel invites highly motivated scientists to apply for the SNI PhD programme in Nanoscience and to join the exciting joint project between the University of Basel and the Paul Scherrer Institute.

The position (your position):

Photosynthesis is a critical process that captures carbon dioxide (CO₂) from the atmosphere and transforms it into organic matter, which forms the primary source of the Earth's biomass and energy storage. However, in polar regions and during winters, the natural photosynthetic activity ceases due to the low temperature. This project aims to develop an unfrozen artificial photosynthetic platform using nanoconfinement to keep water liquid and enable CO₂ fixation at sub-zero temperatures. Lipidic mesophases have proven effective for other enzymatic reactions down to -20 °C. Utilizing this platform, we will incorporate thylakoid membranes from pea plants, containing all necessary enzymes for photosynthesis. The efficiency of this nano-platform at low temperatures will be tested by measuring the generation of adenosine triphosphate (ATP) and nicotinamide adenine dinucleotide phosphate (NADPH). Combination of techniques such as small-angle X-ray and neutron scattering (SAXS and SANS), differential scanning calorimetry (DSC), broadband dielectric spectroscopy (BDS), and quasi-elastic neutron scattering (QENS) will be employed to analyse nanoscale self-assembly and the impact of molecular dynamics on photosynthetic efficiency at low temperatures.

Requirements:

For this project, we are seeking a candidate with a strong scientific background and a Master's degree in any field relevant for the project.

We offer:

- Excellent scientific and social environment
- Very competitive employment conditions
- Membership in a very supportive and recognised community

The successful candidate will become a member of a very active research group and of the Swiss Nanoscience Institute (SNI) PhD school with ~30 currently supported scientists. The SNI covers a wide variety of topics, including cutting edge quantum physics and chemistry, material science, nanotechnology, biochemistry, cell biology, or medical research.



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Application / contact:

More information and the online **application platform** can be found at www.phd.nanoscience.ch. For questions please contact the head of the SNI PhD programme, Dr. Andreas Baumgartner (andreas.baumgartner@unibas.ch), or directly the project leader Yang Yao (yang.yao@unibas.ch). The application has to be completed before 31 December 2024. Please note that the decision to fill a given vacancy can be taken at any time from now.