



Reticular Chemistry at Interfaces

Principle investigators:

Prof. Dr. Patrick Shahgaldian – University of Applied Sciences Northwestern Switzerland (MuttENZ) and Swiss Nanoscience Institute.

Prof. Dr. Jonathan de Roo – University of Basel

In the Shahgaldian group (Laboratory of Molecular Nanotechnology of the University of Applied Sciences Northwestern Switzerland), we are working on the design of molecular systems able of self-assembly and molecular recognition^[1-3]. In DeRooLab (Department of Chemistry, University of Basel), we are working on the synthesis and analysis of nanocrystals and atomically precise clusters.^[4-6]

Despite tremendous research on MOF design, it is remarkable that the current synthetic methods do not apply to 2D MOF nanofabrication, and do not allow the production of large MOF single crystals. The foremost objective of the RESTRAIN PhD program is to fill this considerable gap by using well-defined and tailor-made nanocluster-based secondary building units with a series of novel polytopic linkers. Those layers shall be used as templates to grow, in a controlled fashion, large MOF single crystals.

Your tasks

The project asks for a well-trained nanoscience or chemistry graduate with a strong background in synthetic chemistry and an interest in physical chemistry. In her/his first two years, the candidate will be introduced to the chemical synthesis of designer amphiphiles and supervised to learn monolayer preparation techniques in the Shahgaldian group (FHNW). In parallel, the student will gain experience in cluster synthesis and purification, X-ray scattering analysis and surface chemistry in De Roo Lab (UniBasel). The interfacial self-assembly properties of the newly produced systems will be investigated by means of the Langmuir balance technique, Brewster angle microscopy, surface ellipsometry, X-ray photoelectron spectroscopy, and atomic force microscopy. In the last year of this Ph.D. program, the work will mainly focus on the use of well-defined 2D MOFs as templates to grow large 3D MOFs and gas phase separation.

Your profile

You are highly motivated and have a Master in Nanosciences or a Master in Chemistry. You have a strong background in synthetic chemistry and interest in physical chemistry, you enjoy working in a small multidisciplinary and multicultural team.

You will be registered as a PhD student in the graduate program of the Swiss Nanoscience Institute at the University of Basel.

Please submit your application through the dedicated online application system [Project Restrain]

<https://biped2.sni.unibas.ch/application/form/22/1>

References

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- [4] J. De Roo et al. *Nat. Mater.* **2016**, *15*, 517
- [5] E. Dhaene et al. *Nano Lett.* **2019**, *19*, 7411
- [6] Z. Hens and J. De Roo. *J. Am. Chem. Soc.* **2020**, *142*, 15627