

## Mesoporous materials for nanofilters

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### Summary

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*The proposed Ph.D. project is focused on developing mesoporous structures for application in nanofilters. The Si-based materials to be synthesized will be evaluated in terms of optoelectronic properties, ability to collect heavy metals from aqueous solutions, and antibacterial toxicity. The most promising materials will be employed for the fabrication of novel filters; the performance of assembled filtering systems will be conducted.*

Research field:	Chemical, materials and energy technology
Supervisors:	Dr. Svetlana Polivtseva Dr. Olga Volobujeva
Availability:	This position is available.
Offered by:	School of Engineering Department of Materials and Environmental Technology
Application deadline:	Applications are accepted between June 01, 2023 00:00 and June 30, 2023 23:59 (Europe/Zurich)

### Description

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The ever-increasing amount of fashion industry waste has a detrimental impact on the environment, accounting for 10% of global CO<sub>2</sub> emissions and generating 20% of wastewater. By 2050, around 160 million tons of textile waste will be discarded annually, further increasing negative consequences. Such consequences can become especially tragic if we consider the scarcity of freshwater for many people staying in conflict zones. In extreme cases, urine solutions with their theoretical recovery capability of up to 95% can become the only available water resource. Thus, finding a solution, ideally, a joint solution, for both complex problems is essential.

The proposed doctoral project aims to elaborate on a technology for synthesizing mesoporous SiC materials with desired properties using textile waste as a precursor system. The expected project outcomes will link the formation process and obtained properties of SiC structures. Understanding such cross-links are needed for prototyping filter systems that are efficient for the purification of water resources.

The Ph.D. student is expected to synthesize mesoporous SiC structures, modify their surface properties, and characterize their optoelectronic properties by using numerous characterization techniques vs the ability to chelate metal cations, decompose organic compounds and kill the bacteria. Antibacterial tests will be performed as collaborative activities.

### Requirements for the applicant:

- MSc. in Chemistry, Physics, Materials Science, Chemical Engineering or equivalent.
- Previous experience in materials synthesis and characterization
- Good command of English written and spoken
- Out-of-the-box thinking



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