Empa
Materials Science and Technology

Master thesis:

Characterization of aerosol released from abrasion of 2D material reinforced composites and *in vitro* safety assessment of abraded particles on human lung and gastrointestinal cell cultures

Introduction

2D materials are under intense research due to their high technological potential for a broad variety of applications *i.e.* electronics, energy storage, but also in the field of nanomedicine. A major application of 2D materials (*e.g.* boron nitrite, graphene related materials) is as reinforcement material for composites to improve polymer properties such as thermal and mechanical stability. Due to its emerging nature the potential health risks of released particles during their production, use or disposal, are largely unknown. Moreover, mechanical treatment or abrasion of nanocomposites may release particles containing 2D materials with unknown potential adverse effects on human health.

Aim

The aim of this master thesis project is to characterize the aerosol released from abrasion of 2D material-reinforced composites and to perform *in vitro* toxicity assessment of abraded particles.

- optimize the abrasion process and collect a sufficient amount of abraded particles
- characterize abraded particles released from the composites during an abrasion process
- investigate the biological effects of pristine materials and released aerosol particles on human cells.

What we offer

You can expect significant support and guidance from established scientists. During your stay you can obtain a broad set of lab skills in the material and nanosafety field, including composite abrasion and particle characterization, analytical techniques, advanced imaging, cell culture and molecular biology techniques. Costs for public transportation and housing can be arranged.

Contact details

Interested and suitable candidates may send a CV and short motivational statement including research interests as PDF to:

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Earliest start	03.05.2021 (latest start 01.07.2021)
Latest end	approximately 6 months from the start of project
Location	Empa St. Gallen, Switzerland
Labels	Master Thesis
Keywords	2D materials, polymer composites, abrasion process, *in vitro* toxicity assessment, lung and gastrointestinal cell cultures