



TRA105 TRACKS Project Advanced (7.5 credits)

Conveying 2D materials into practice – production and industry potential of graphene



Background

The past decade has witnessed the rapid development of graphene based two-dimensional (2D) nanomaterials. Graphene is a thin sheet of carbon atoms with fascinating physical and chemical properties, such as high surface area, excellent electrical conductivity, extraordinary elasticity and ultra-light weight. This ‘wonder material’ was firstly discovered by A. Geim and K. Novoselov, who were jointly awarded the Nobel Physics in 2010, for their pioneer work in material science that is “all surface and no bulk”.

In 2013, Chalmers University of Technology coordinated one of the largest European research projects ever launched, dedicated to graphene: The Graphene Flagship (<https://graphene-flagship.eu>). It is tasked with bringing together academic and industrial researchers to take graphene from the realm of academic laboratories into European society. For example, large-scale commercialization projects led by key European industrial partners such as Airbus, ABB, Fiat, and Siemens are now undergoing.

Course tasks

We aim at *the introduction of industry-oriented graphene applications*, which will be closely related to our daily lives. As an interdisciplinary course, we will provide you the knowledge and information about the mass production of graphene based 2D materials, challenges and opportunities in graphene commercialization. Some examples of graphene industrial potentials

in Chalmers will be shared with you. In addition, we will provide you with the opportunity to participate in our graphene-based projects related to renewable energy and environmental challenges. You can select either the topic of energy storage devices or water purification, to design and test the graphene-based coin-cell batteries or water-filter systems by yourself.

Prerequisites

As a cross-disciplinary course, both master and PhD students are welcome to join us with the following backgrounds:

- Basic courses in chemistry, materials science, biology, and metal/chemical engineering
- Experience in nanotechnology and nanoscience are meriting but not a requirement.

Teachers

Zhenyuan Xia, Jinhua Sun, Vincenzo Palermo

How to apply

If interested, apply to the course by sending a short motivation letter and your course transcripts to: zhenyuan@chalmers.se; jinhua@chalmers.se
We plan to recruit 10-20 students to ensure sufficient lab resources and capacities. It means that we can't guarantee that all applicants can participate in our project course.

Study Period: February-June 2022 (LP3 & LP4)

The deadline for application is December 20, 2021