

Synthesis of Graphene/Vulcan based Au and Pt catalysts for SDE - SO₂ revalorization and hydrogen generation

Topic suitable for Master Thesis / Project Lab

The production of clean hydrogen from renewable sources generally relies on the use of electrolyzers, in which the water molecule is electrochemically split in order to isolate hydrogen. Traditional water electrolyzers are, unfortunately, energy intensive. The **Sulphur Depolarized Electrolyser – SDE**, uses SO₂ as feed, obtaining two valuable products instead of one: hydrogen, and H₂SO₄ as a by-product. Furthermore, due to the change in the reactions carried out in the electrolyser, the theoretical voltage is reduced from 1.23V in a traditional water electrolyser down to 0.156V in the SDE. This results in a lower energy consumption, allows the use of less noble materials and mitigates the cost by adding a secondary valuable product such as H₂SO₄.

Within this work, **graphene/Vulcan based Au/Pt catalyst** will be synthesized for a SDE system. **Working packages are:**

- **Literature research** and comparison of synthesis methods
- **Preparation/Pre-treatment** of supporter materials for catalysts.
- **Synthesis** of Au/Pt over Graphene/Vulcan catalysts
- **Catalyst Coated Membrane** confection

