



2D graphdiyne-based porphyrin analogues supporting Ni single atom for water-splitting applications



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Purpose:

This project aims to address the environmental difficulties caused by excessive fossil fuel use, such as global warming and climate change. The initiative intends to help mitigate these critical concerns by developing renewable and sustainable energy alternatives, such as hydrogen generation by water splitting.

Aim:

To Fabricate and characterize the Ni-based single atom catalyst on graphdiyne-based porphyrin through SEM analysis, detailed SEM-EDS line scan, mapping, and additional techniques such as XPS, FTIR, XRD, and TEM. Subsequently, to evaluate the catalytic performance of the prepared catalyst in electrochemical water splitting using a three-electrode system. The successful completion of the fabrication and testing phases will culminate in the composition of a master thesis and the submission of scientific publications.

Results, important findings

- Fabrication confirmed via Fourier Transformed Infrared Spectroscopy (FTIR), indicating the presence of desired chemical bonds characteristic of Ni SGPA.
- SEM and SEM-EDX analyses affirmed the successful synthesis and elemental composition of the Ni SGPA sample.
- XPS and XRD experiments provided insights into the structural properties and crystalline nature of the Ni SGPA catalyst.
- Electrochemical tests including Linear Sweep Voltammetry (LSV) and Electrochemical Impedance Spectroscopy (EIS) were conducted, showcasing the superior activity and stability of the Ni SGPA catalyst compared to a cobalt-based sample.

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