STudent REseArch Mobility Programme (STREAM)
Research Project proposal

Host University: Leiden University

Main Research Field (drop-down list): 15. Natural Sciences

Specified field, subject:
Chemistry, Materials Science, Physics

Research project title:
Operando research in heterogeneous catalysis

Possible starting month(s):

Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
☒	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐

Exact starting and end dates will be discussed between the supervisor and the student

Possible duration in months:

- Minimum: 3 months (preferably 6 months or longer)
- Maximum: 2 semesters

Suitable for students in: ☒ Bachelor level ☒ Master level

Prerequisites:

- Minimum GPA 3.2 out of 4
- Sophmore level chemistry or physics or materials science with strong interest in physical chemistry and/or heterogeneous catalysis.

Description:
The nanoscale structure of a catalyst under reaction conditions determines its activity, selectivity, and stability. For the production of sustainable energy and materials, new catalysts are needed. By understanding the structure-activity relationships of catalysts under reaction conditions, insight in the development of these new catalysts can be obtained. Using in situ imaging techniques under industrial conditions, we are currently studying Fischer-Tropsch synthesis, NO reduction and oxidation, hydrodesulfurization, CO oxidation, and chlorine production. The student will be involved in ongoing research investigating the relationship between the structure of the active phase of a catalyst and its activity under industrially relevant conditions. These studies will be performed using scanning tunnelling microscopy in high-pressure, high-temperature conditions. The student will learn the following experimental techniques: scanning tunnelling microscopy, X-ray photoelectron spectroscopy, low-energy electron diffraction, and mass spectrometry. Catalyst preparation consists of physical vapor deposition of nanoparticles onto oxide films on single crystals.

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Faculty and/or Department:
Faculty of Science / Leiden Institute of Chemistry (LIC)

Deadline for nomination to reach Leiden University:

- 1 April (for Fall semester intake) / 1 October (for Spring semester intake).
- Please note: Due to the COVID-19 situation and measures taken, we expect to offer this project again per **Spring 2023**. However, the project might be cancelled if empirical research in the institute is impeded by COVID-19.

Notification of admission given by the end of:
Approximately 6 weeks after receipt of the application.

Additional information:

- Number of places available per semester: 1.

Contact person:
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