

## Project Title: *Direct Electrolytic Ammonia Production*

**Thesis Location:** Materials for Energy Conversion and Storage (MECS) – Applied Sciences

**Daily Supervisor:** *Davide Ripepi*

**Supervisor:** *Fokko Mulder*

### Scope of the Research Challenge:

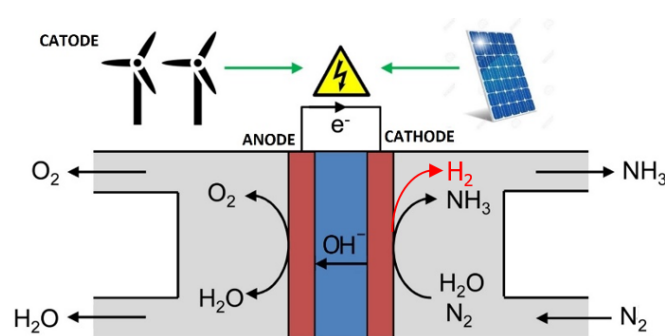
Ammonia synthesis is one of the largest chemical production processes in the world using more than 1.5 % of the global energy demand. The current production of ammonia is exclusively done by using methane as the energy and hydrogen source in the Haber-Bosch process, which has a limited energy efficiency and large CO<sub>2</sub> emissions. The aim of this proposal is to investigate the direct electrolytic ammonia synthesis from water and nitrogen with an electrolysis system design that enables the efficient generation of ammonia, completely clean and without CO<sub>2</sub> emissions.

When successful, the CO<sub>2</sub> free electrolytic production of ammonia from renewable electricity has an important role to play in several markets. These roles are a) the ammonia market, b) the liquid fuel market, and c) the electricity market in which the electrolyzers are assets that can take up peak renewable electricity supply (wind, solar power), while stored ammonia can be converted back to electricity.

### What will you be doing?

In this project we would like to tackle the problem of:

- Making 3-D electrodes
- Use advance characterization techniques (XPS, SEM, XRD)
- Test a new catalysts for nitrogen reduction to ammonia.



### What do we require of you?

We expect that you

- will be enthusiastic and eager to learn about electrochemistry
- will maintain a safe working environment and learn about the standards in the lab
- will show a great deal of autonomy by the end of you project

### What can you expect of your work situation?

During the period of your thesis you will be based at the university working within the larger MECS group. Throughout the project you will learn to organize and communicate the results to your peers through 2 presentations to the group, and the writing of a thesis report. Together this will take approximately 7/8 months at full-time (38 hours/week).

The MECS group also has an inviting coffee break together every day at 10:30, and a borrel every Wednesday at 17:00. Once you're a part of the group we encourage you to join and discuss life and work with your new colleagues!

### Interested in this thesis end project?

Please contact the daily supervisor at the details below to arrange for a discussion about the project!

Contact [Davide Ripepi](#) (Daily Supervisor) at [D.Ripepi@tudelft.nl](mailto:D.Ripepi@tudelft.nl), with cc to [f.m.mulder@tudelft](mailto:f.m.mulder@tudelft.nl) (project leader).