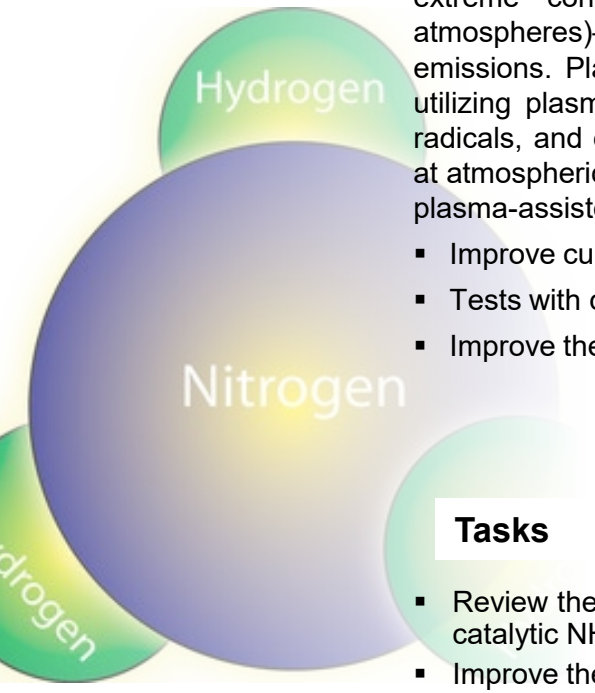
Master-Thesis/Bachelor-Thesis/ADP

Plasma-driven catalytic ammonia synthesis under atmospheric pressure

TECHNISCHE UNIVERSITÄT DARMSTADT

RSM Reaktive Strömungen + Messtechnik



Motivation & Background

The traditional ammonia synthesis method, the Haber-Bosch process, operates under extreme conditions—high temperatures (400-500°C) and high pressures (150-300 atmospheres)—leading to substantial energy consumption and significant greenhouse gas emissions. Plasma-assisted ammonia (NH_3) synthesis represents a promising alternative, utilizing plasma—a state of matter composed of ionized gases, including electrons, ions, radicals, and excited molecules—to convert nitrogen (N_2) and hydrogen (H_2) into ammonia at atmospheric or near-atmospheric conditions. This project aims to study the for on-demand plasma-assisted ammonia synthesis in a DBD reactor. Key objectives of this project include:

- Improve current design for NH_3 synthesis with DBD
- Tests with different operation conditions including catalysts, flow rate, discharge powers.
- Improve the energy efficiency and NH^3 production

Tasks

- Review the literature, especially plasma-assisted catalytic NH_3 synthesis and water electrolysis
- Improve the reactor and test bench
- Experiments under different conditiosn
- Analyze data and results
- Intermediate and final presentations, write the final thesis

Focus Areas

Experiment	●●●
Construction	●○○
Modelling	○○○
Data analysis	●●○

Date

16.02.2026

Start From

Flexible

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