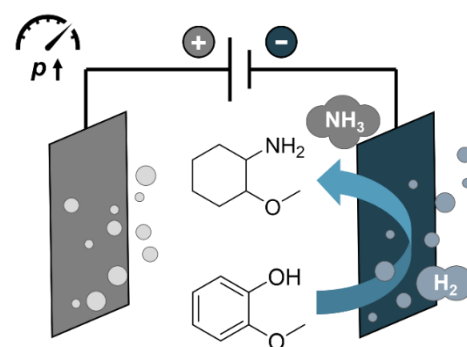


Master Thesis

Electrochemical reductive amination (hydroamination) of biomass-derived oligomers using a novel pressure electrolysis reactor

Lignin is the most abundant natural source of aromatic compounds. In contrast to the conventional, fossil fuel-based aromatic feedstock, a biorefinery based on electrochemical lignin valorization offers a promising sustainable pathway for highly functionalized key- and drop-in chemicals. One especially desired group of intermediates are primary di- and polyamines, as they address the demand for sustainable monomers and crosslinkers in the adhesive industry for the production of bio-based polymers and foams. Guaiacol is a suitable model molecule for investigating the aromatic nature of lignin-derived oligomers and has already been successfully hydroaminated through heterogenous catalysis.

This master thesis is embedded in a government-supported research project and focuses on the electrochemical valorization of lignin, and especially the comparison with the "classic" heterogenous catalyzed pathway. A novel, custom electrochemical setup for electrolysis under pressure (H_2 and NH_3) shall be commissioned and tested using known electrochemical reactions, such as hydrogen evolution reaction (HER, alkaline water electrolysis). Using carbon-based noble metal catalysts, produced in our lab and spray-coated onto a porous carbon electrode, the electrochemical reductive amination of guaiacol shall be investigated. The dual batch autoclave reactor setup enables simultaneous investigation of the heterogenous reaction, allowing for a direct comparison of the "classic" thermocatalytic pathway and the novel electrosynthesis.



Topics: electrolysis, alkaline water electrolysis, HER, electrosynthesis, process- and reactor design, electrode manufacturing, catalysis, carbon materials

Qualifications:

- Experience and conscientious, clean working in a technical-chemical laboratory
- Ability to work independently as well as in a group environment
- Personal initiative and creativity in new fields of research; open to learning new things
- Preferably proficient in fundamentals of electrochemistry (three-electrode-setup, methods, etc.)
- Critical thinking and interpretation, as well as presentation of research results



Fürth, Dr.-Mack-Str. 77, Technikum 2
5 minutes from U1 station *Stadtgrenze*




2025



Interested?

Marius Funke, M.Sc.

 marius.funke@fau.de

 +49 (9131) 85-65111

