

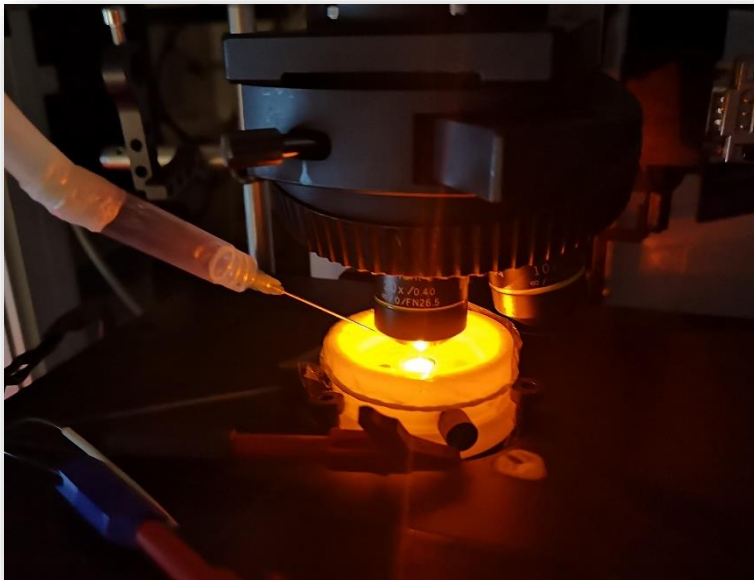
Fakultät Chemie und Lebensmittelchemie
Inez Weidinger

(Foto)-Elektrokatalytische Erzeugung von Brennstoffen und Chemikalien

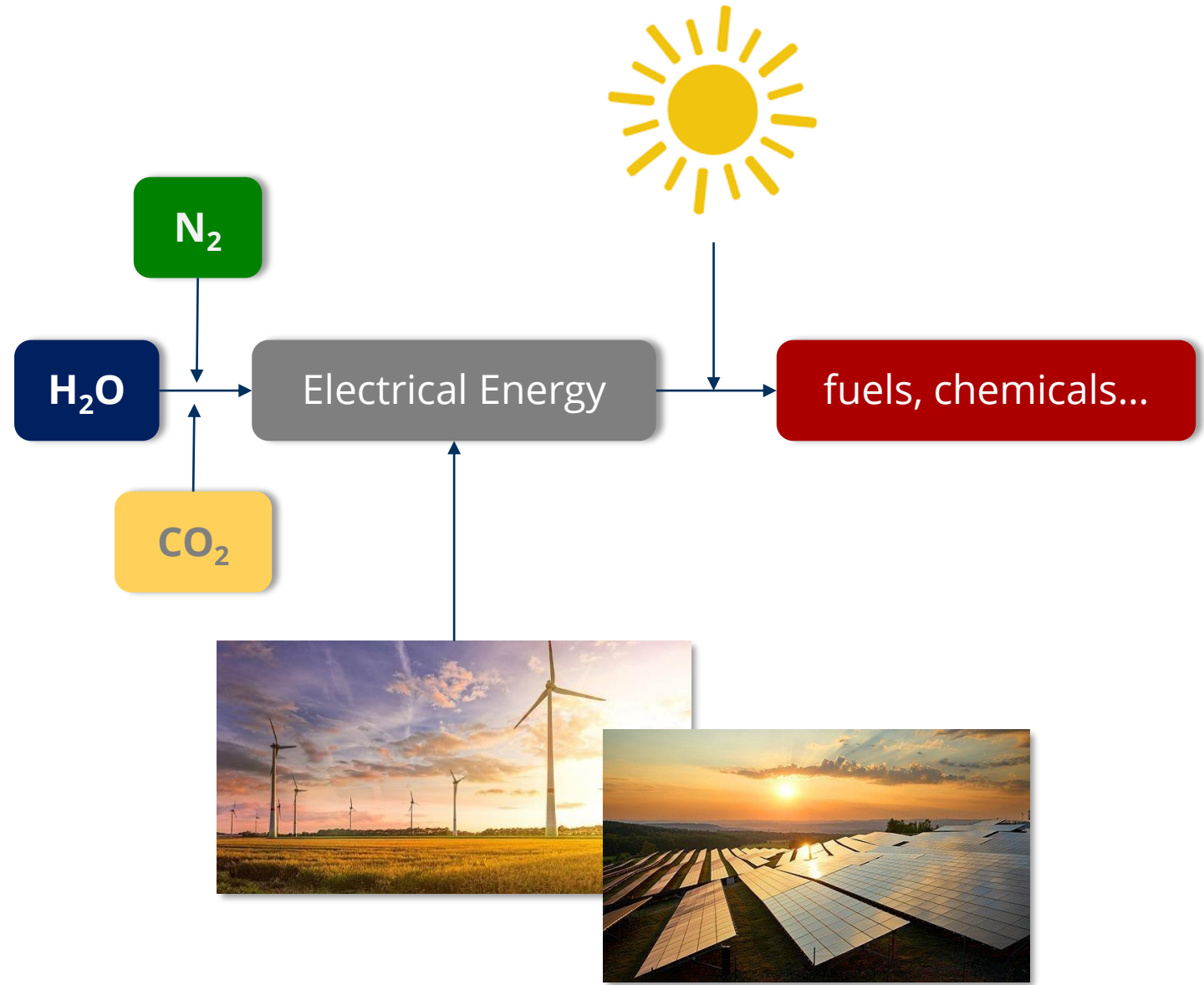
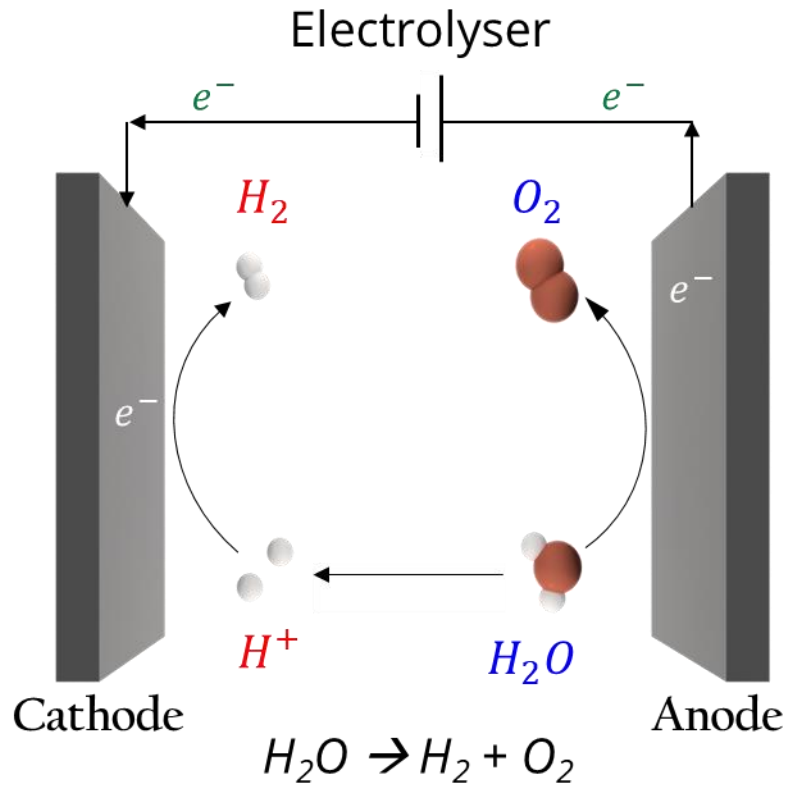
9. INNOVATIONSKONGRESS CHEMIE
31.05.2023

Chair of Electrochemistry

Technische
Universität
Dresden



(Photo)-Electrosynthesis

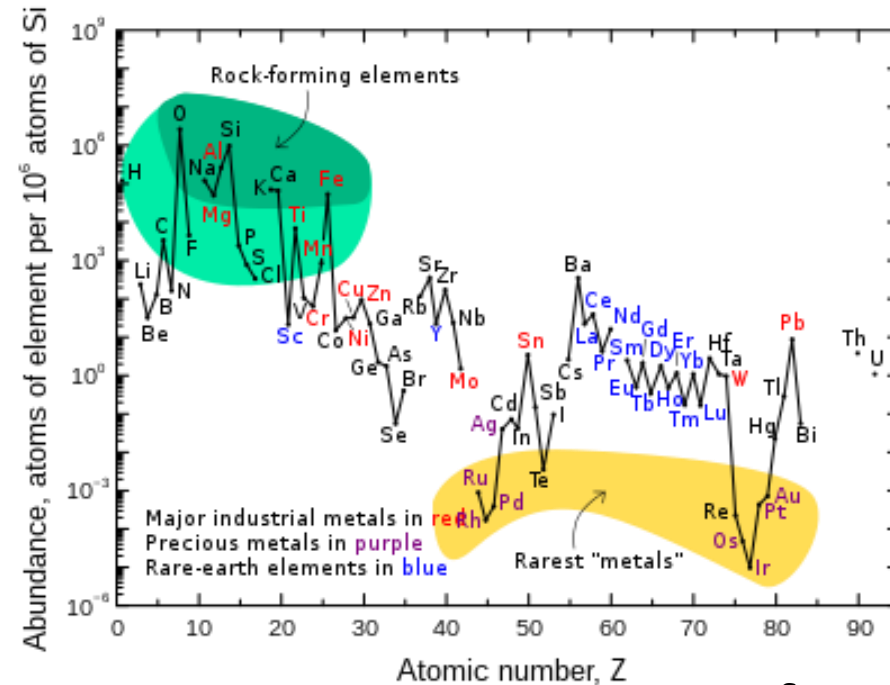
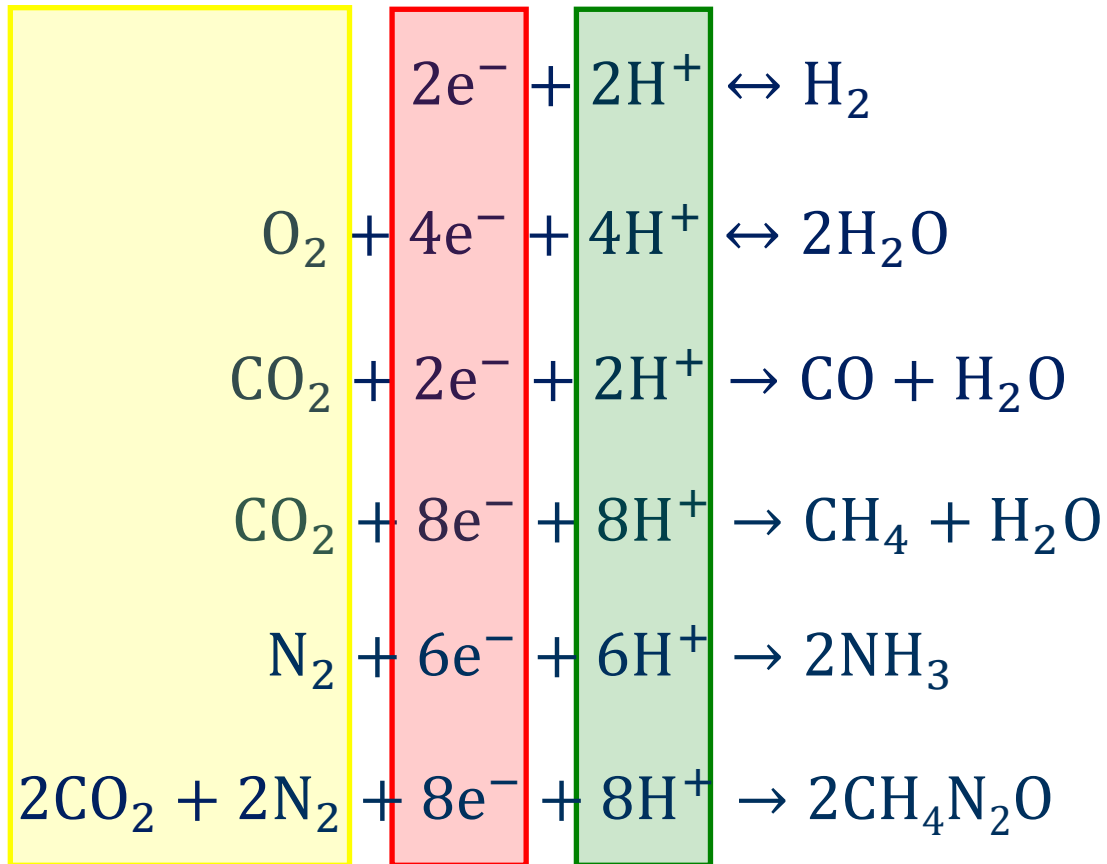


Electrocatalytic Reactions

Cat.

ET

PT



Source: Wikipedia

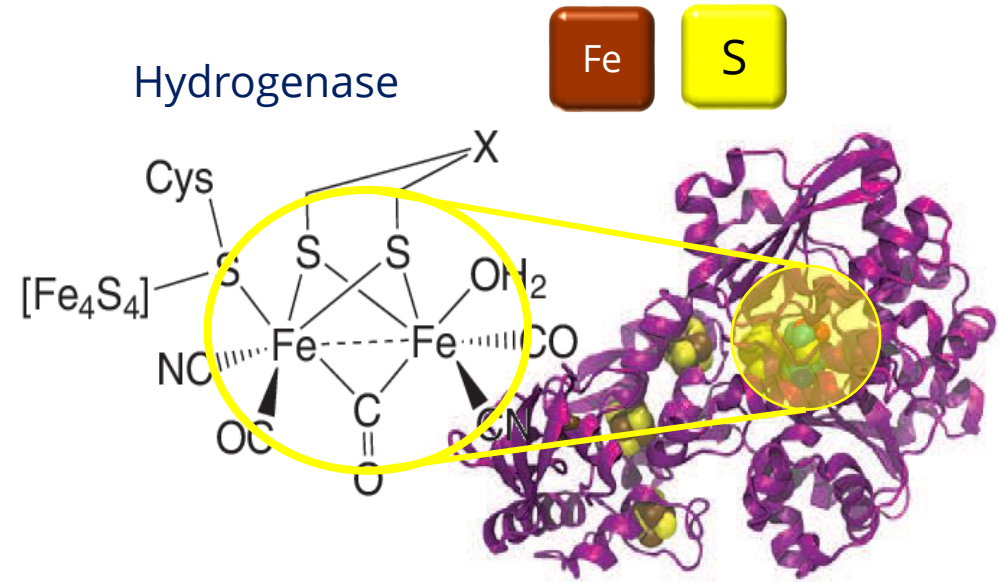
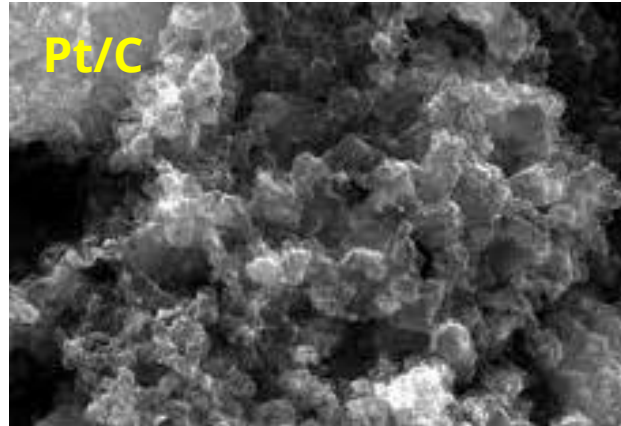


Nature as Inspiration

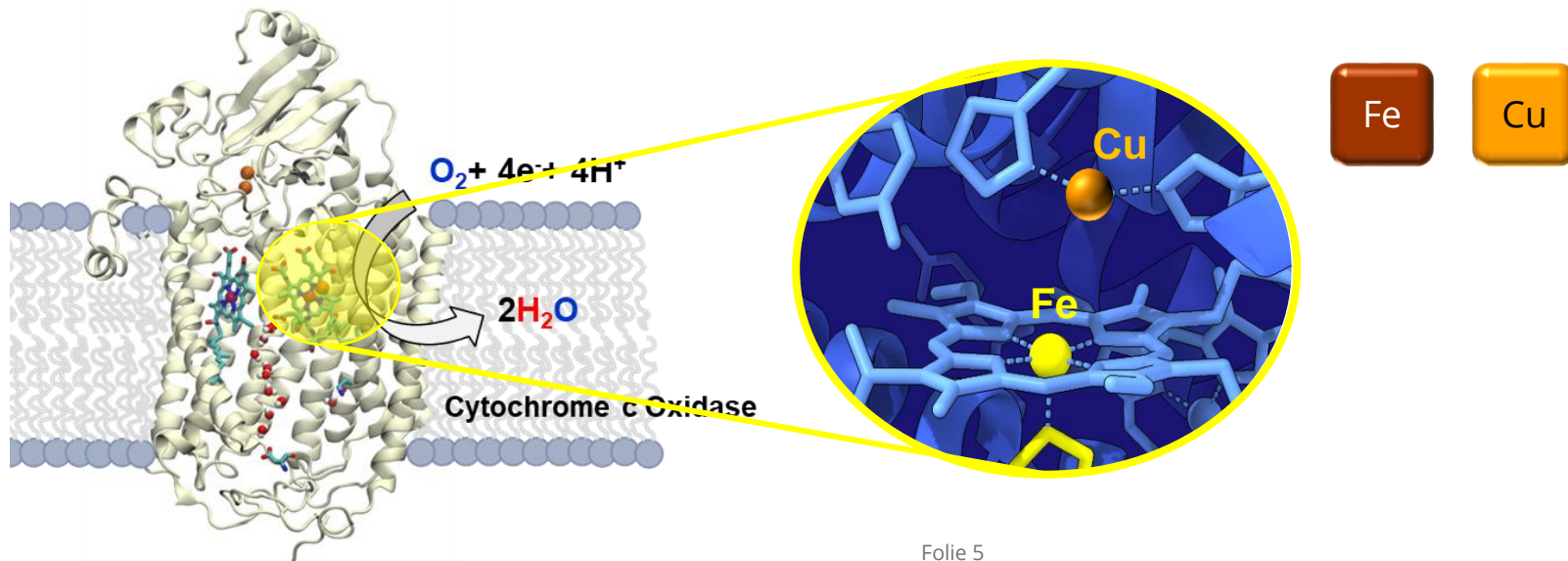
HER



ORR

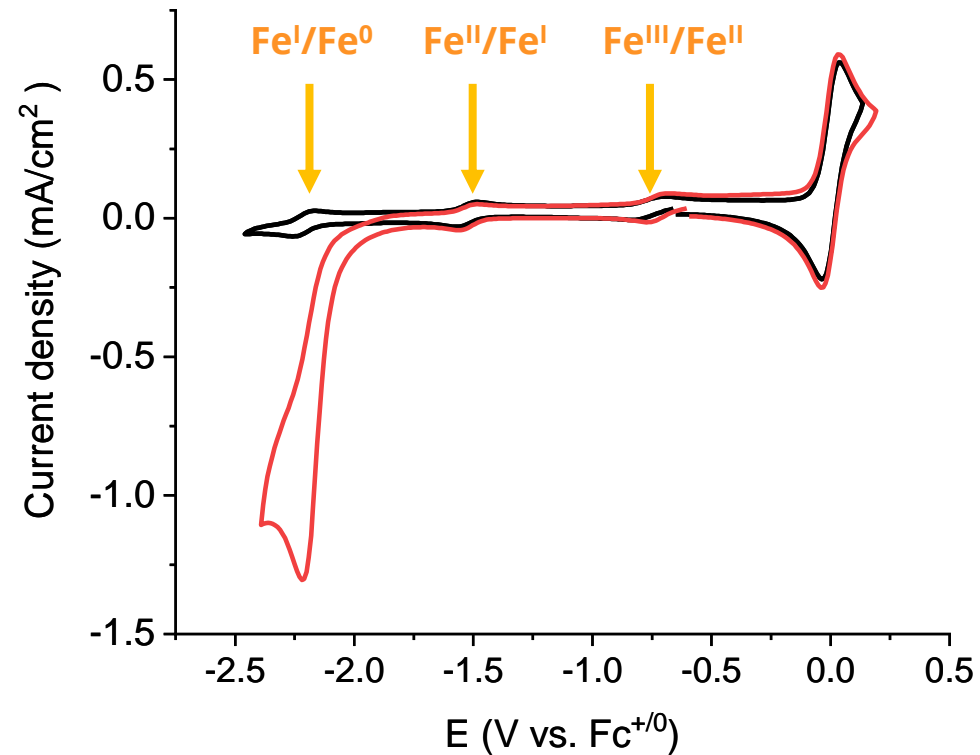
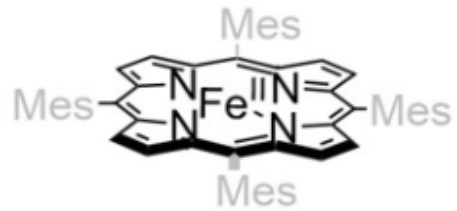


Cytochrome c Oxidase



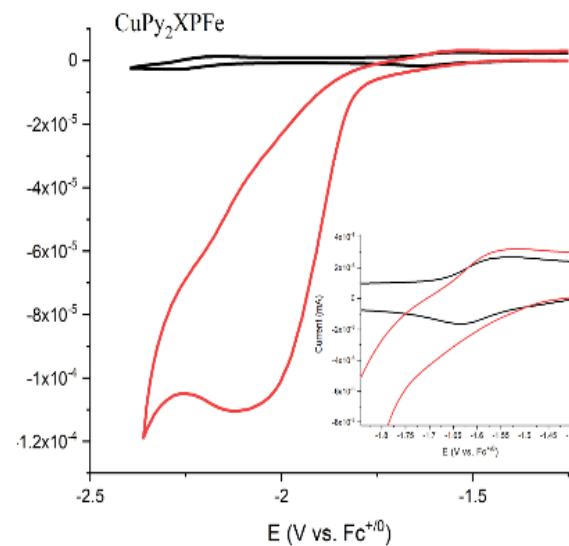
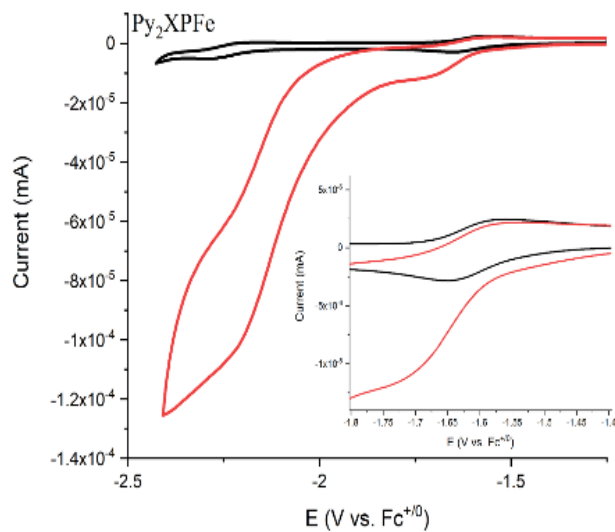
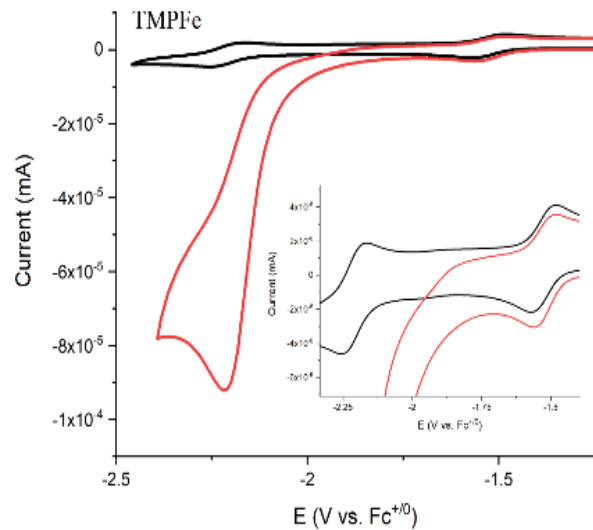
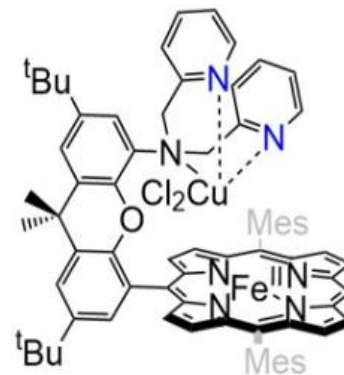
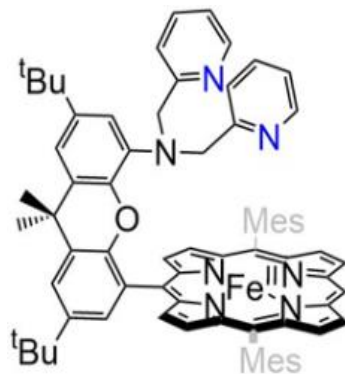
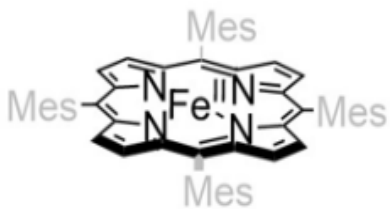
Molecular Catalysts with Second Coordination Spheres

Cooperation with M. Schwalbe, Utrecht Univ.

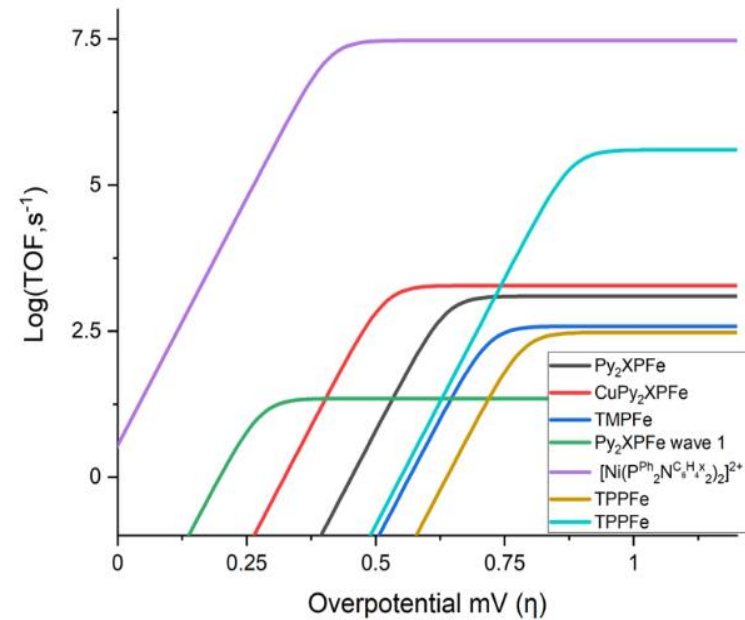
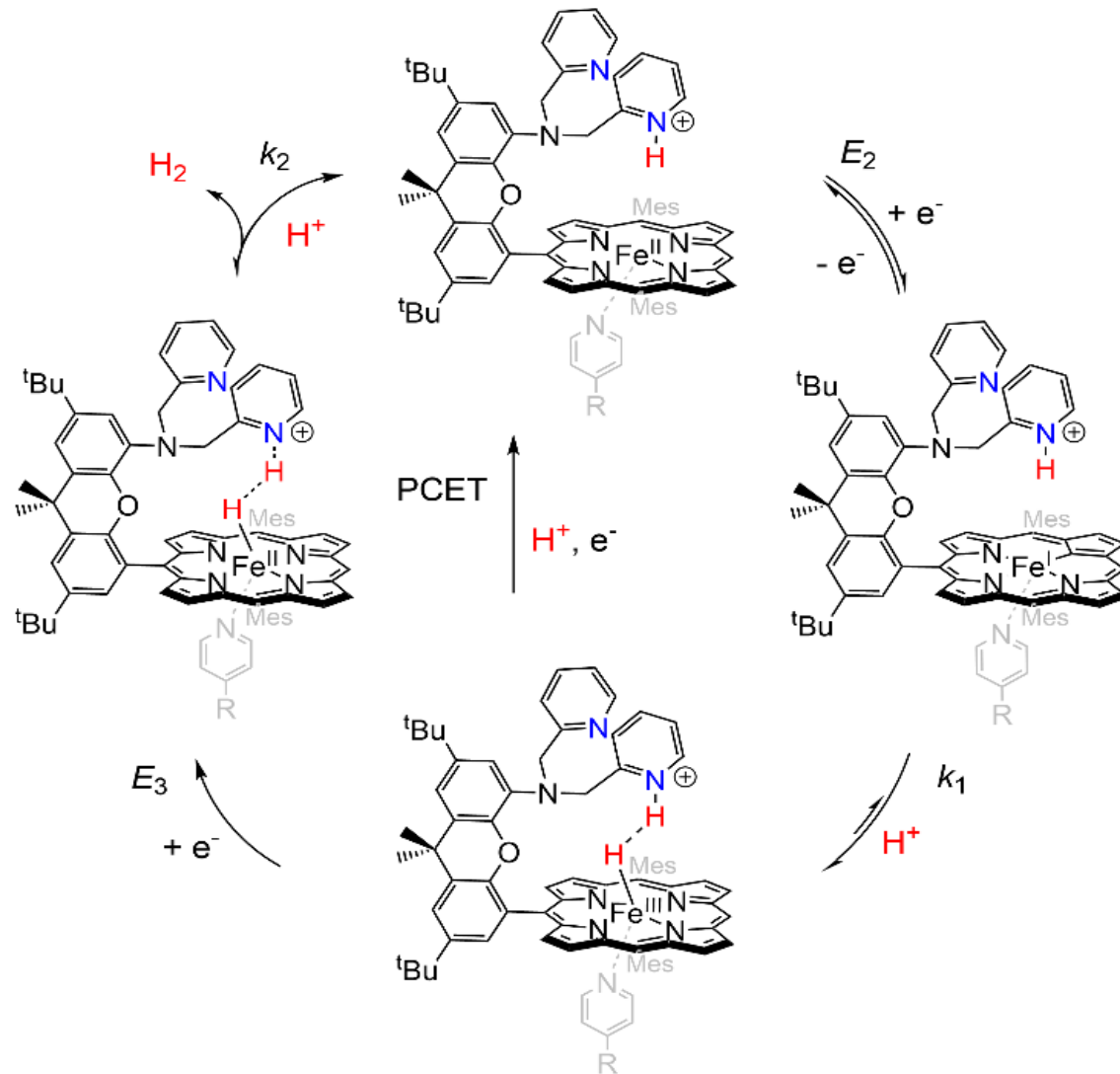


Molecular Catalysts with Second Coordination Spheres

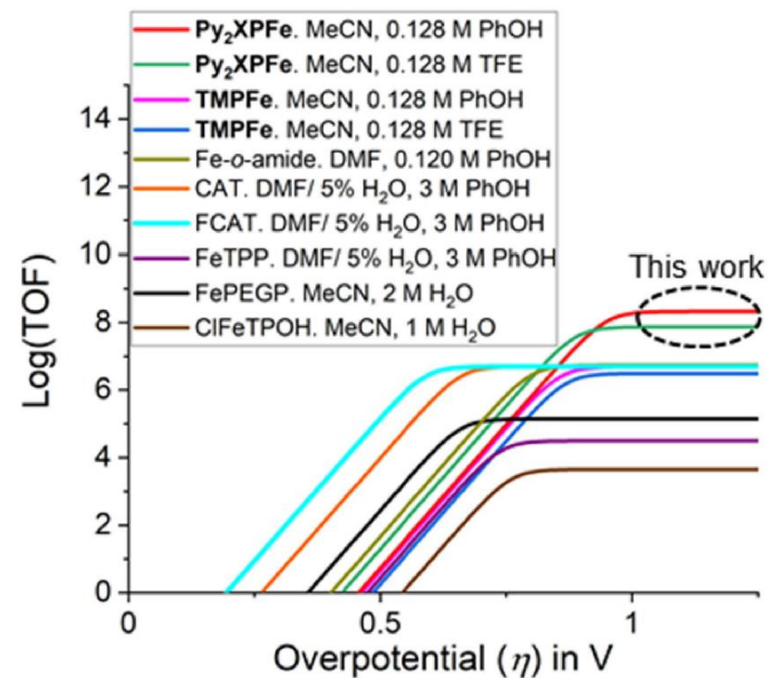
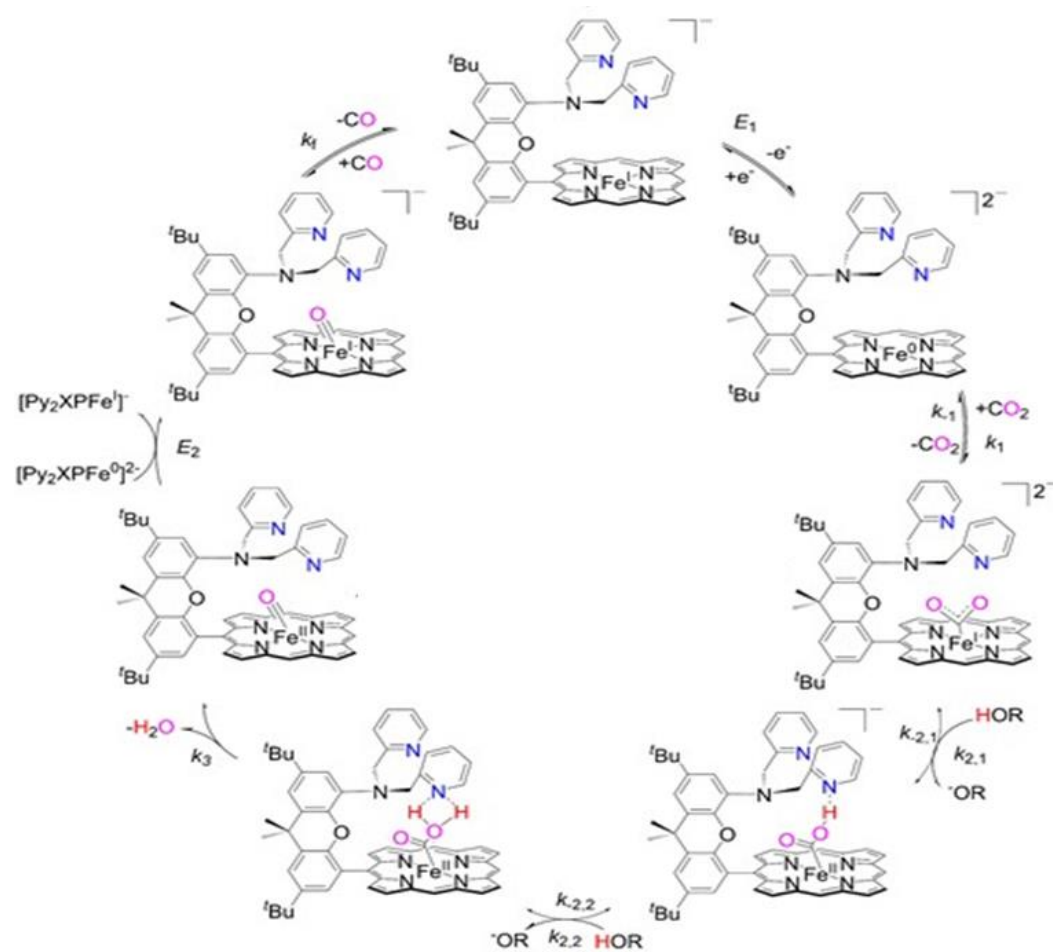
Cooperation with M. Schwalbe, Utrecht Univ.



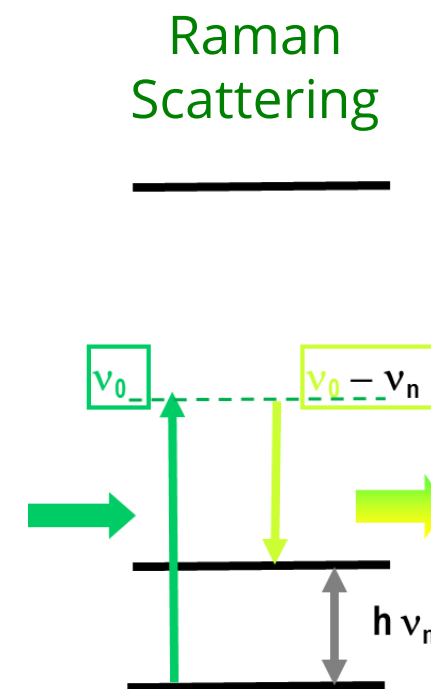
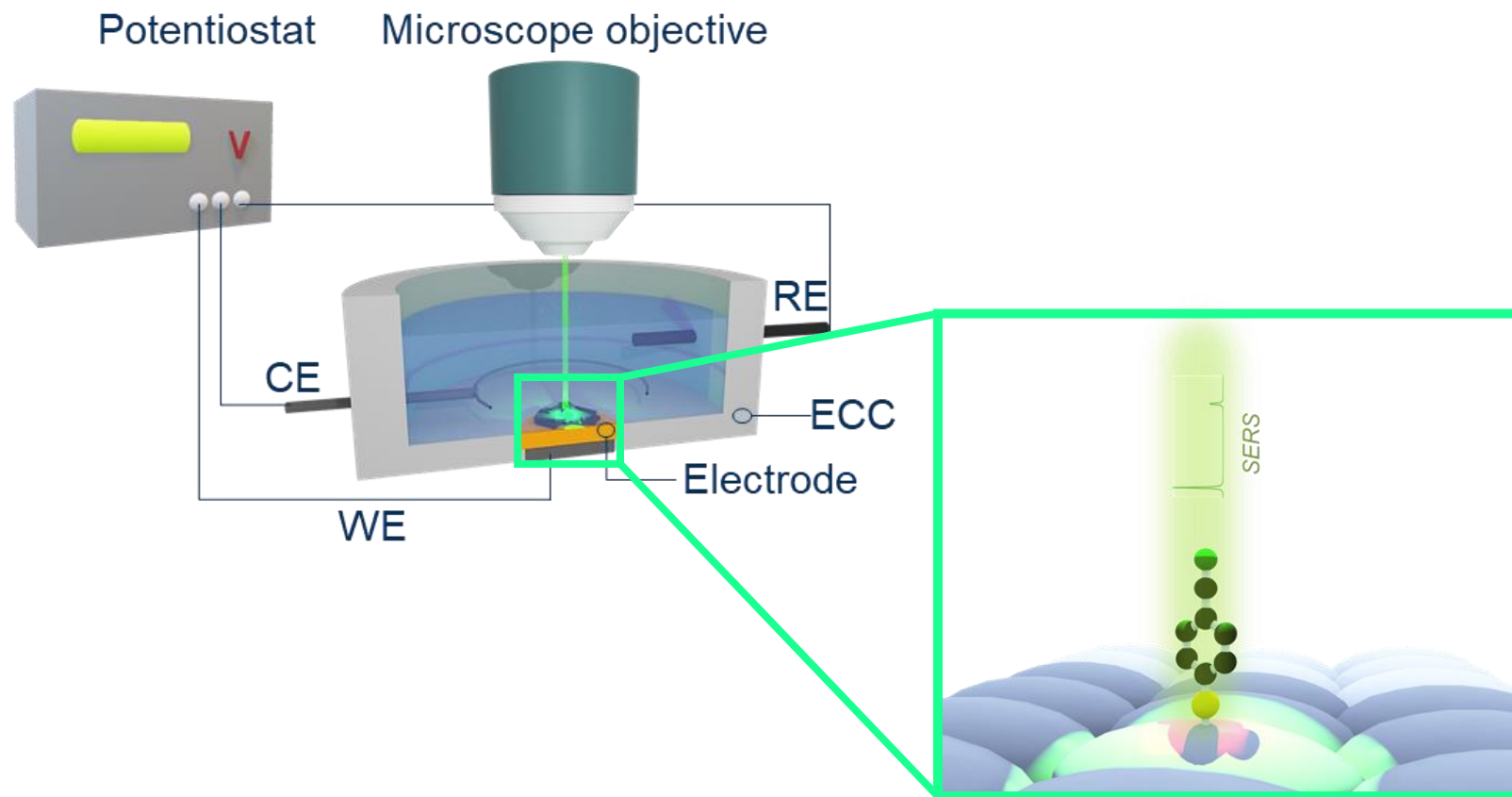
Molecular Catalysts with Second Coordination Spheres



Molecular Catalysts with Second Coordination Spheres



Raman Spectroelectrochemistry

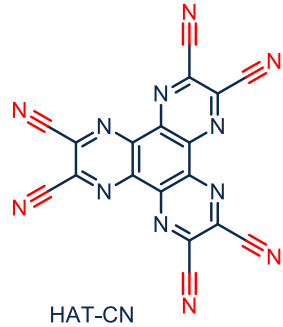


For a review see Ly & Weidinger
Chem. Commun **2021**, 57, 2328-2342

C₂N Materials for Reduction of Nitrogen



Cooperation with M. Oschatz, Univ. Jena



HAT-CN



C-HAT-CN-550

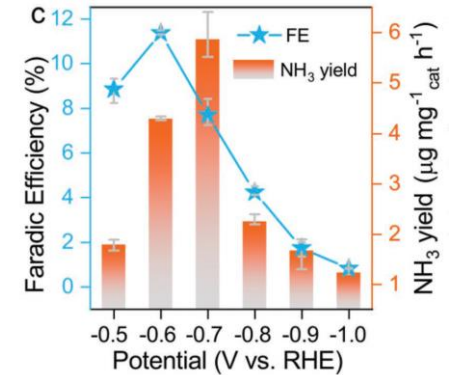
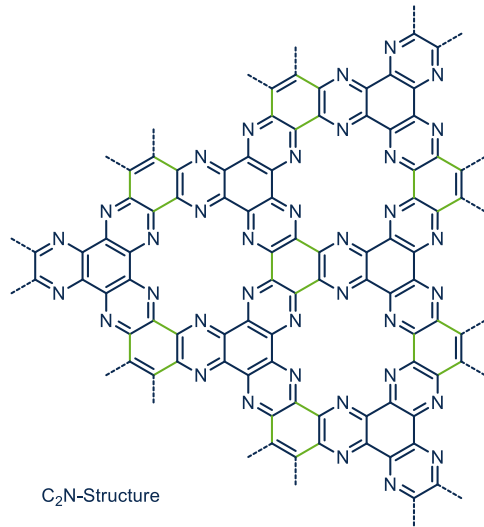


C-HAT-CN-700

Highest Faradaic efficiency towards NH₃



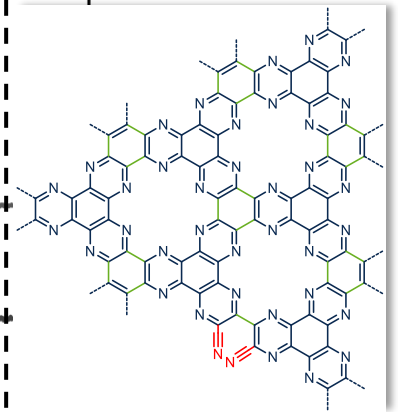
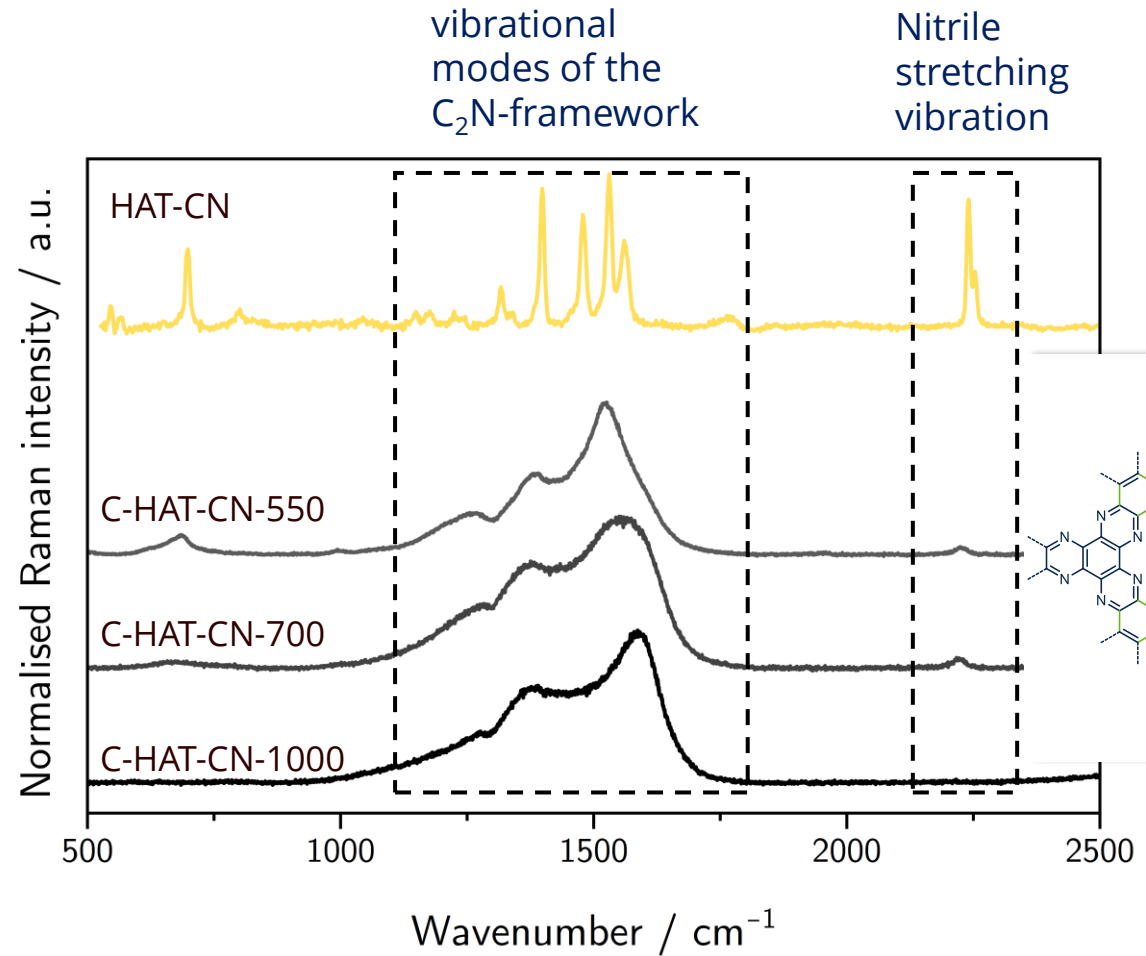
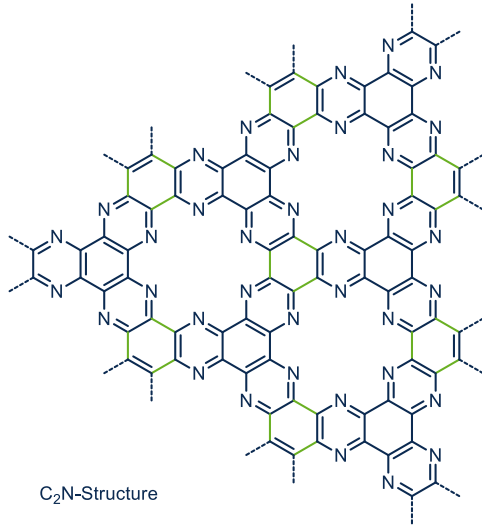
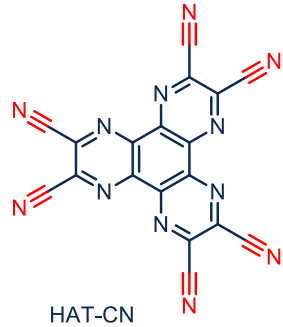
C-HAT-CN-1000



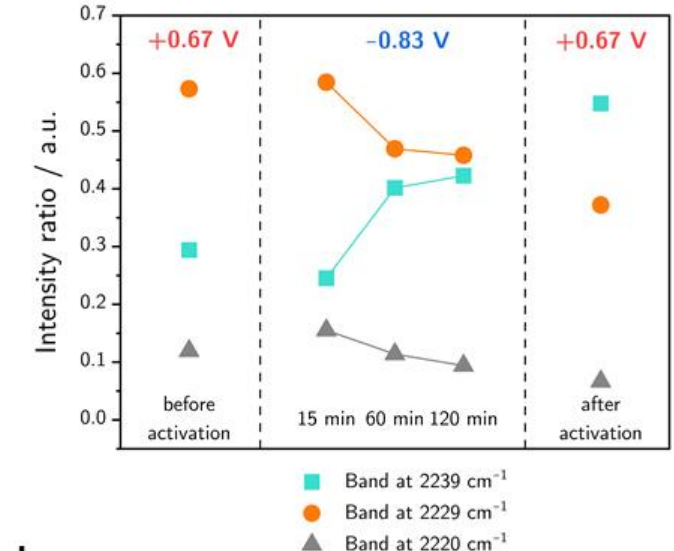
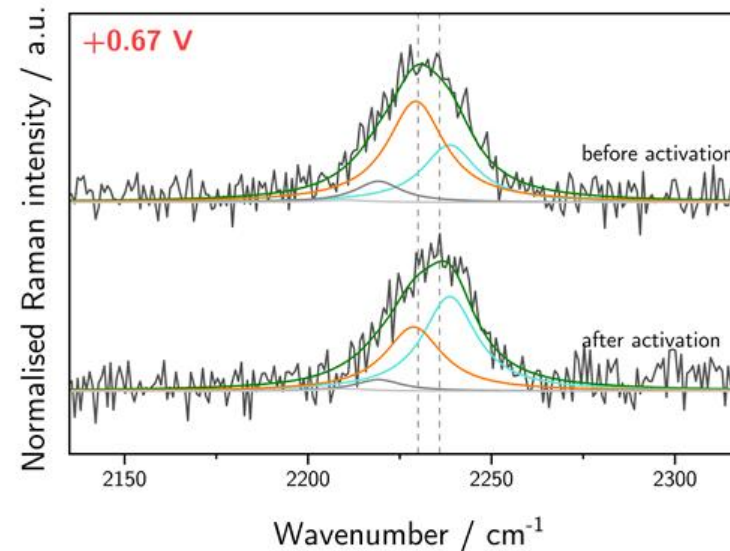
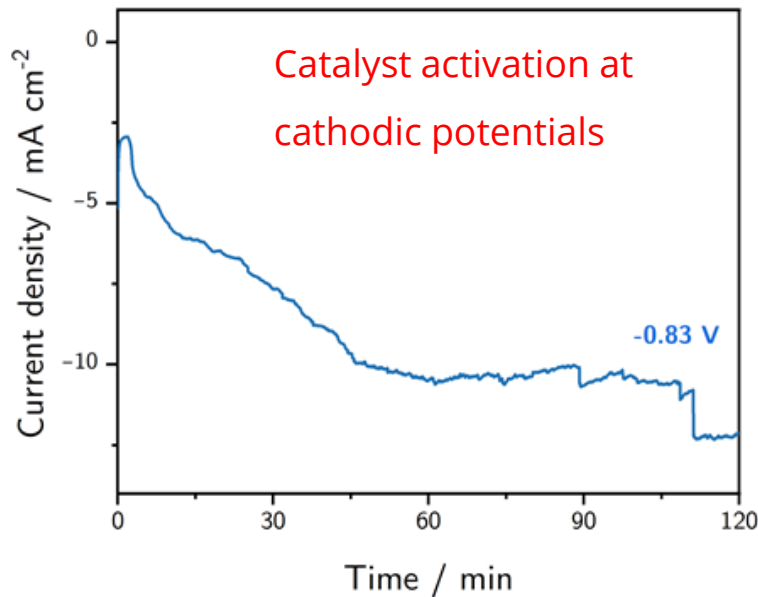
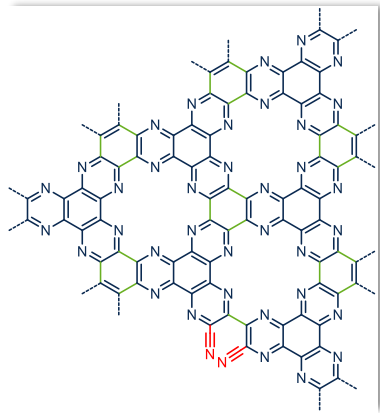
From

Angew. Chem. Int. Ed. 2018, 57, 10765
Small, 2022, 18 2204116

C₂N Materials for Reduction of Nitrogen



C₂N Materials for Reduction of Nitrogen



Scenarios for catalyst activation:

No major reaction of the nitrile groups or structural changes of the C₂N matrix

Shift of electron density from the nitrile groups to the active site

Changes in the electrochemical double layer

Photo-Electrocatalysis by Acetylenic Polymers

Cooperation with X. Feng, TU Dresden

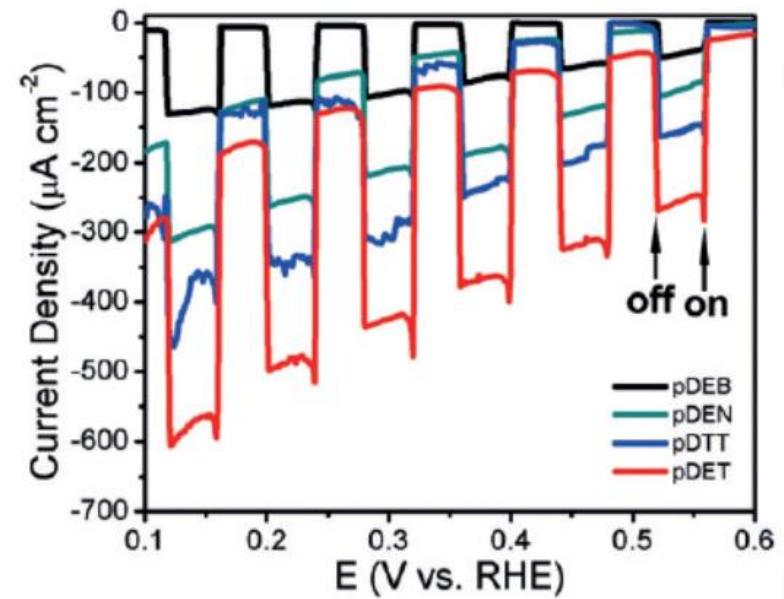
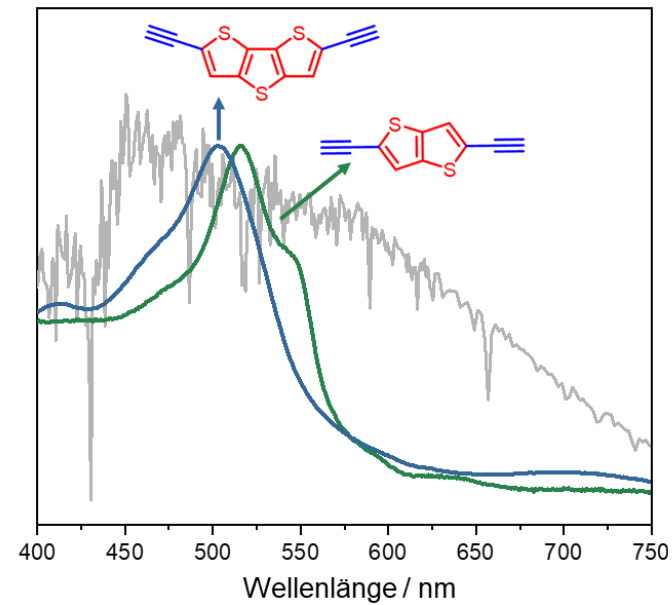
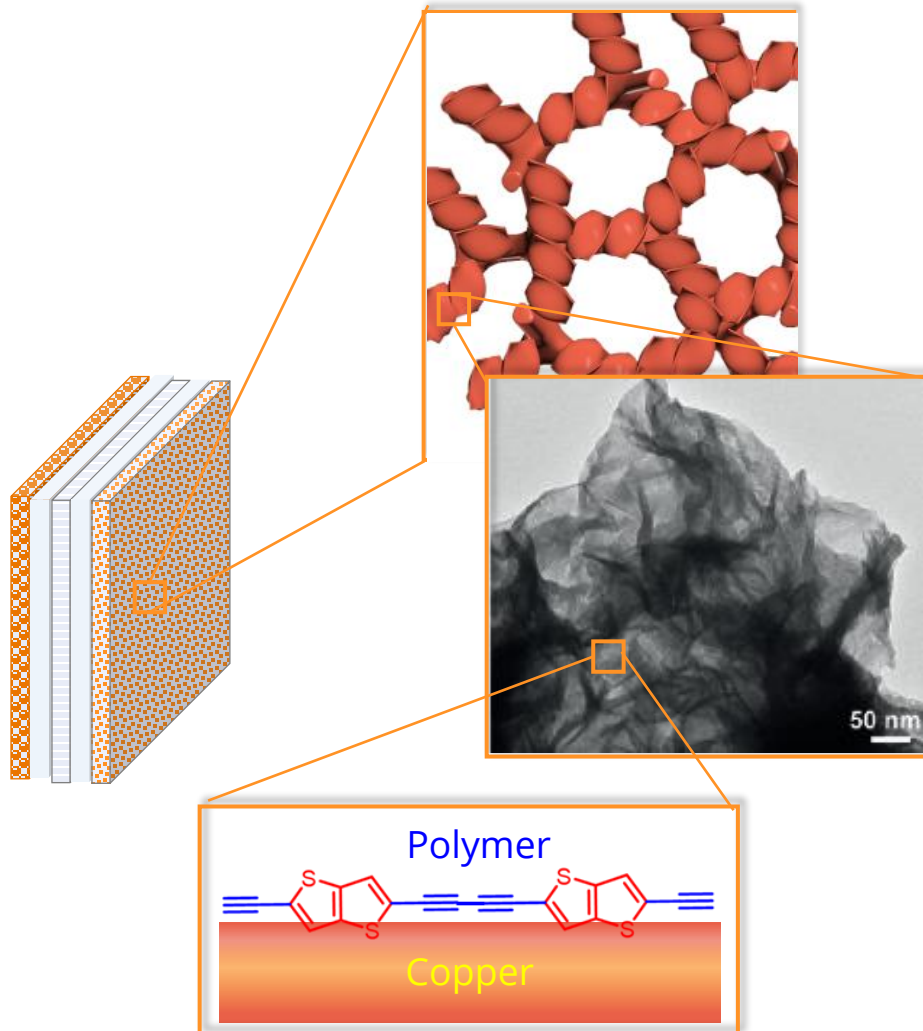
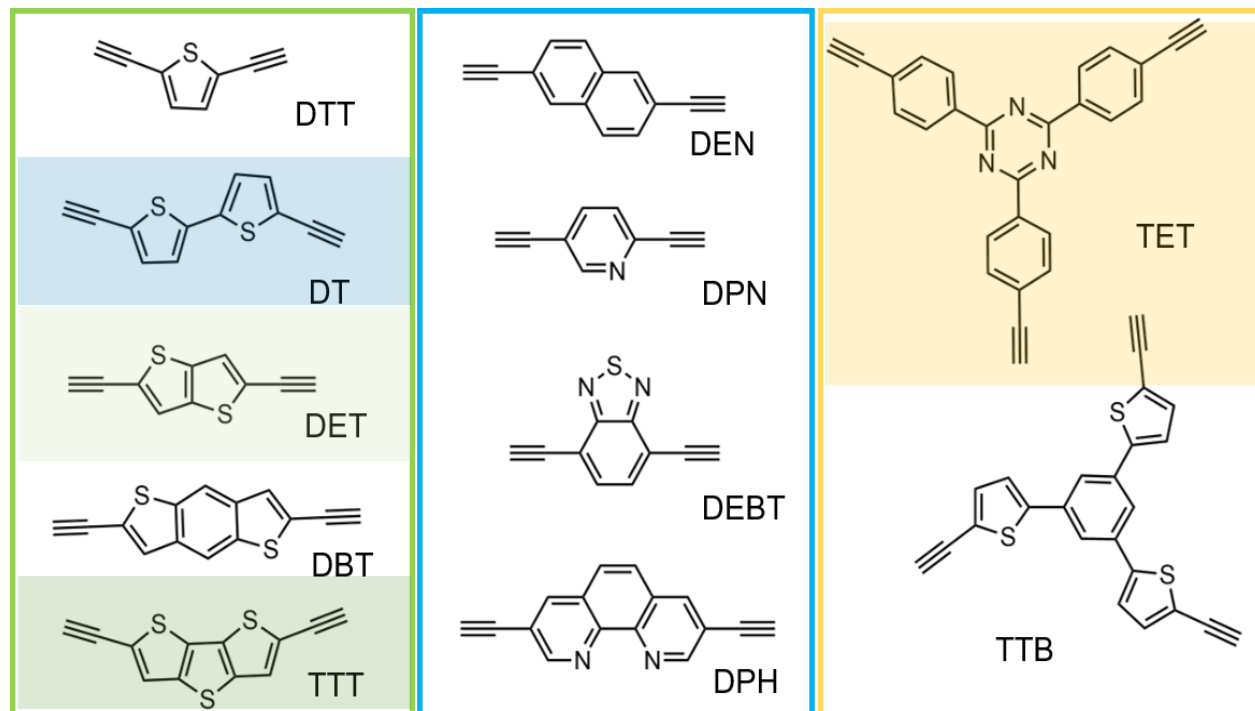
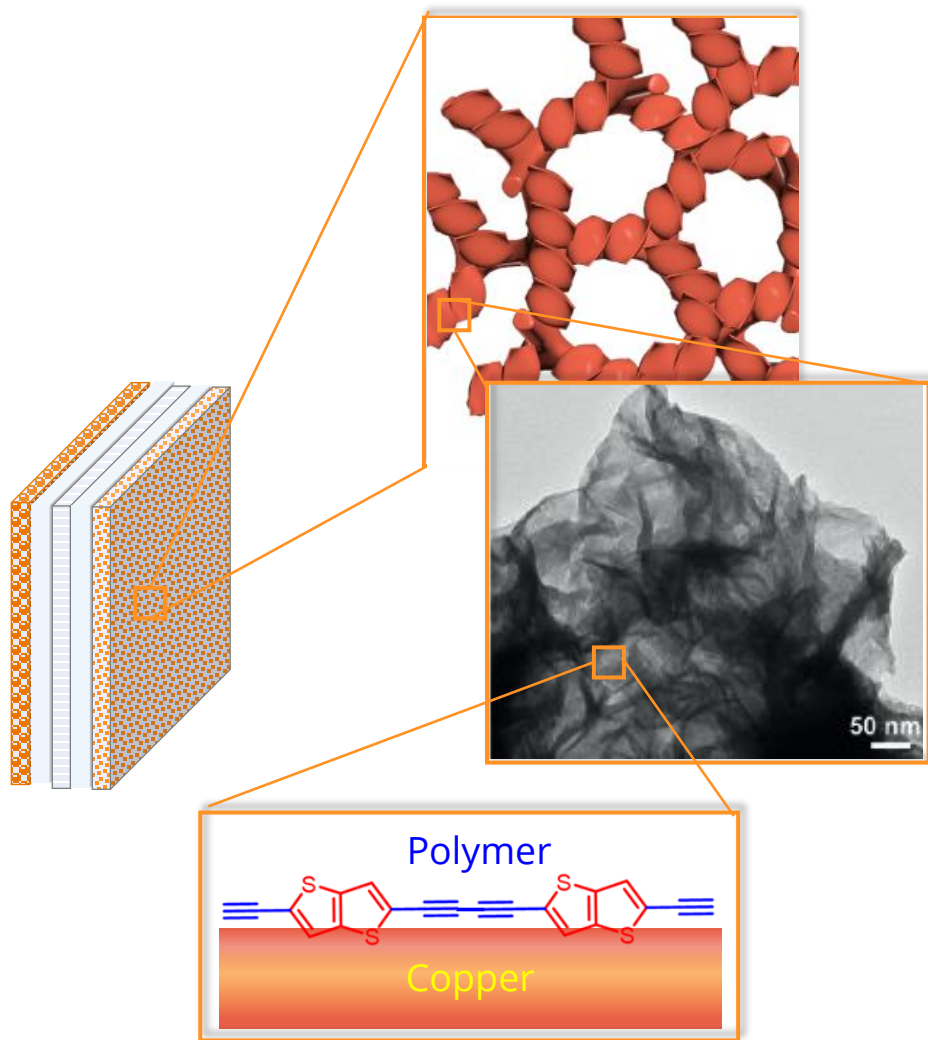


Photo-Electrocatalysis by Acetylenic Polymers



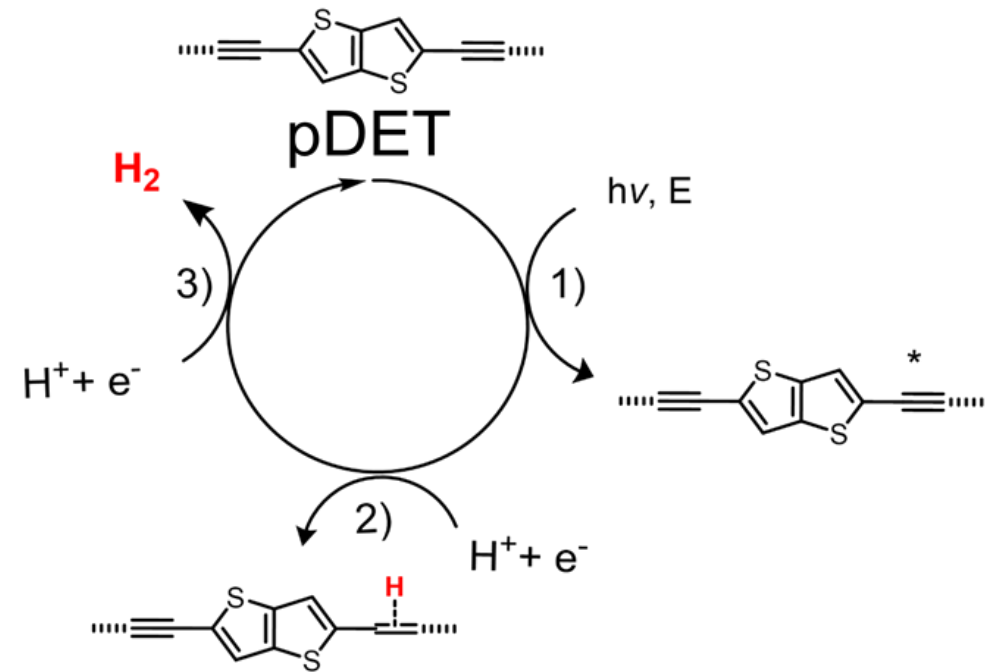
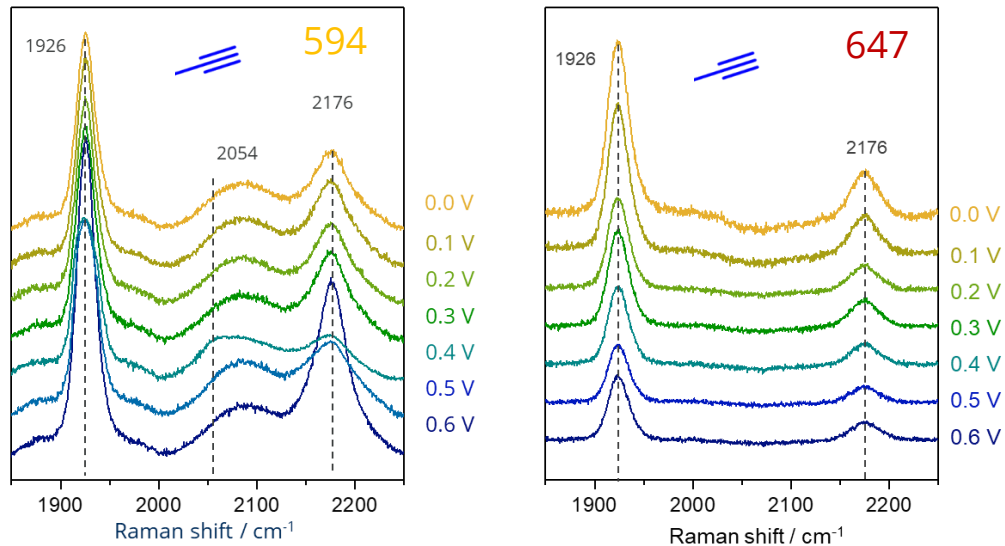
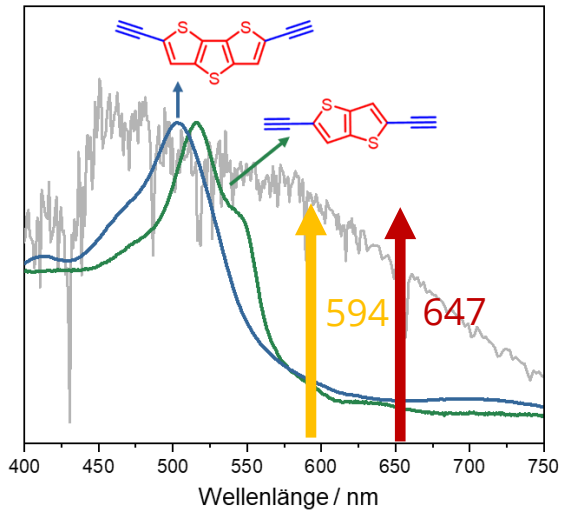
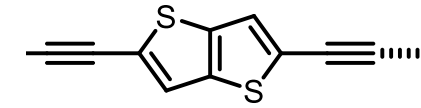
Best HER in neutral conditions

Best HER in alkaline conditions

Bifunctional HER and OER catalyst

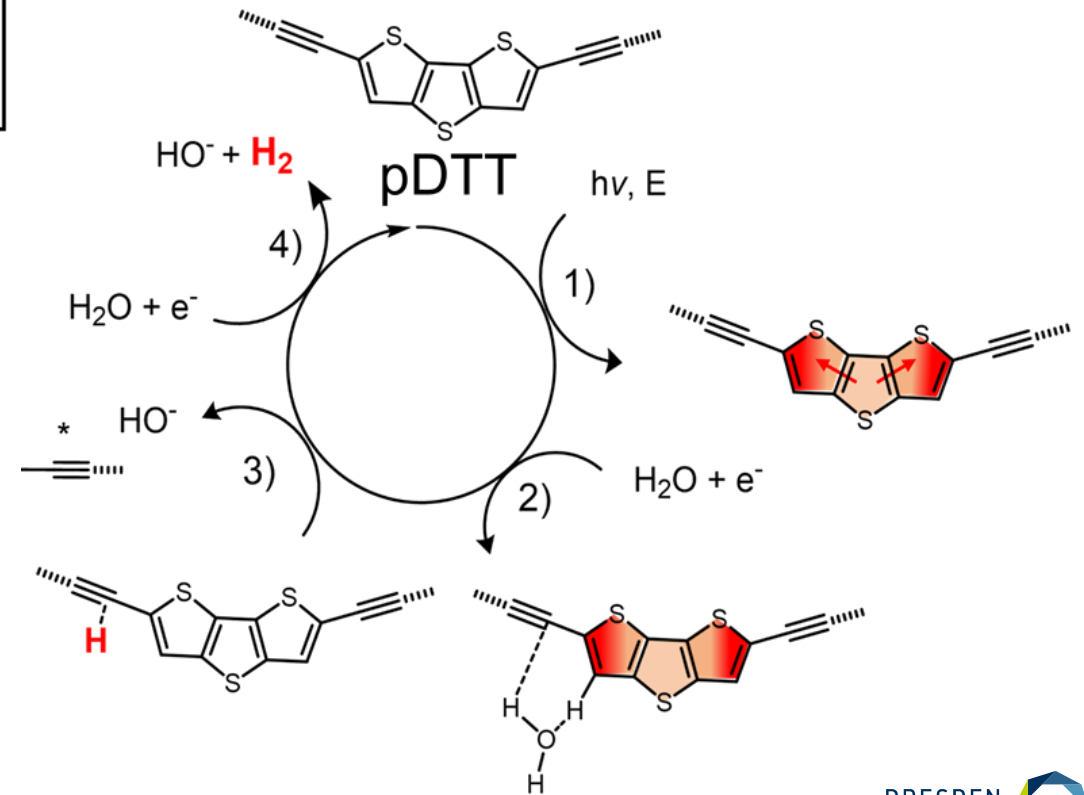
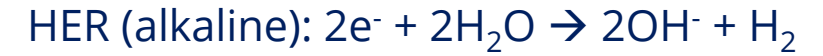
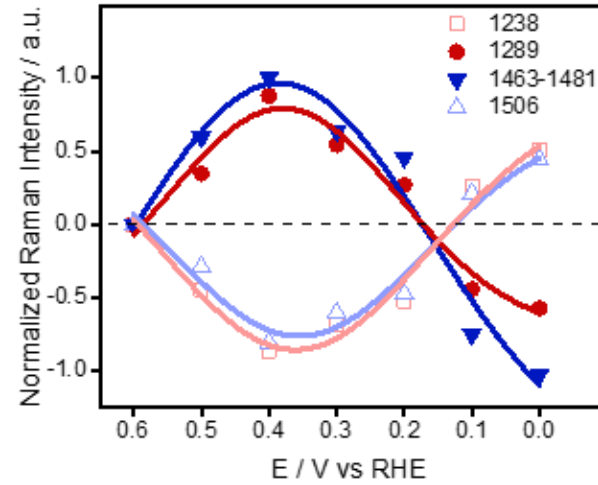
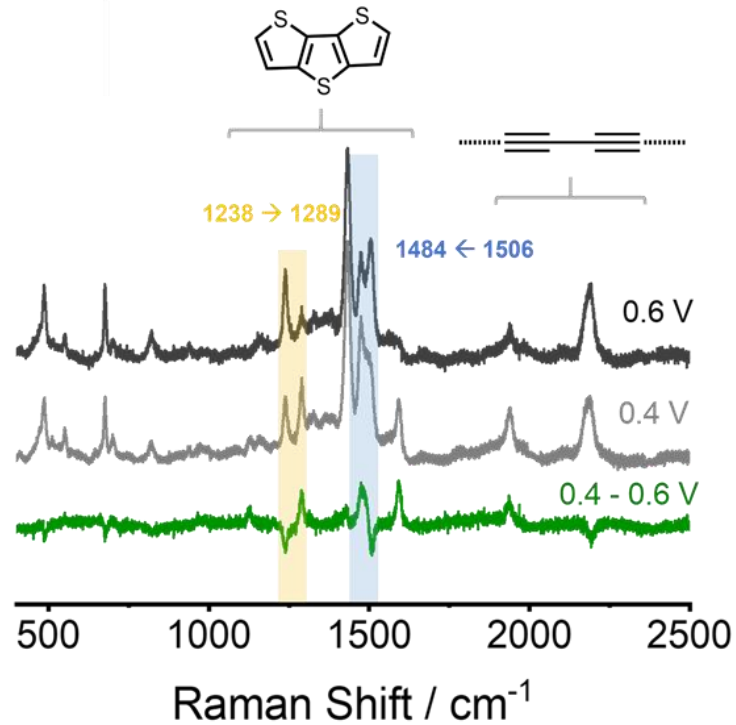
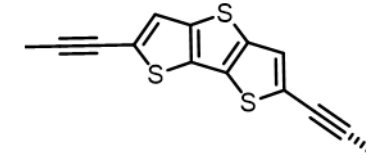
Only CAP that performs NRR

Photo-Electrocatalysis by Acetylenic Polymers



Angew. Chem. Int. Ed. **2019**, *58*, 10368

Photo-Electrocatalysis by Acetylenic Polymers



Angew. Chem. Int. Ed. **2021**, *60*, 18876

Mino Borrelli PhD

Photo-Electrocatalysis by Acetylenic Polymers

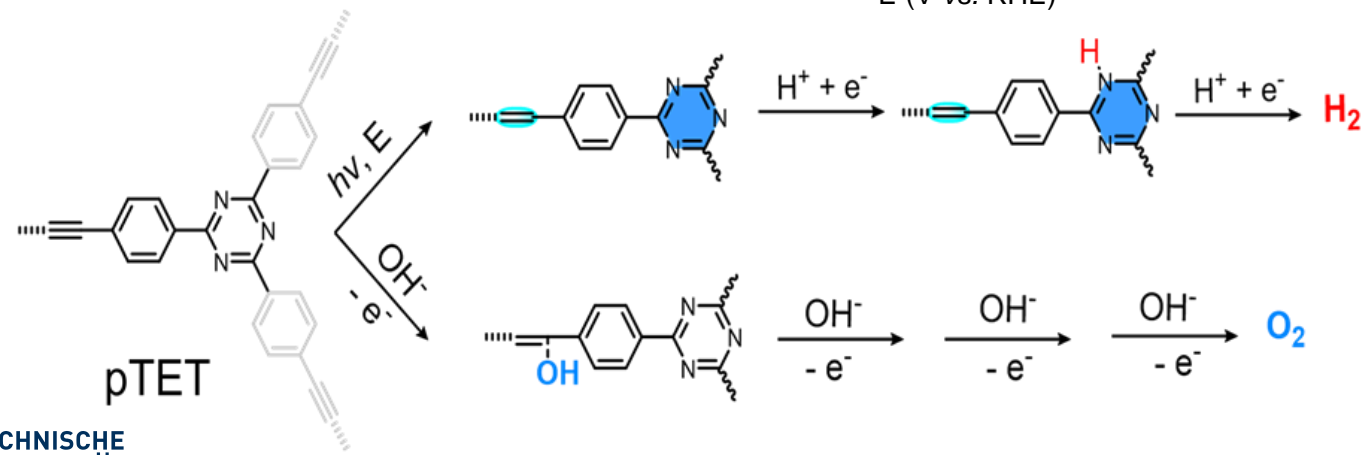
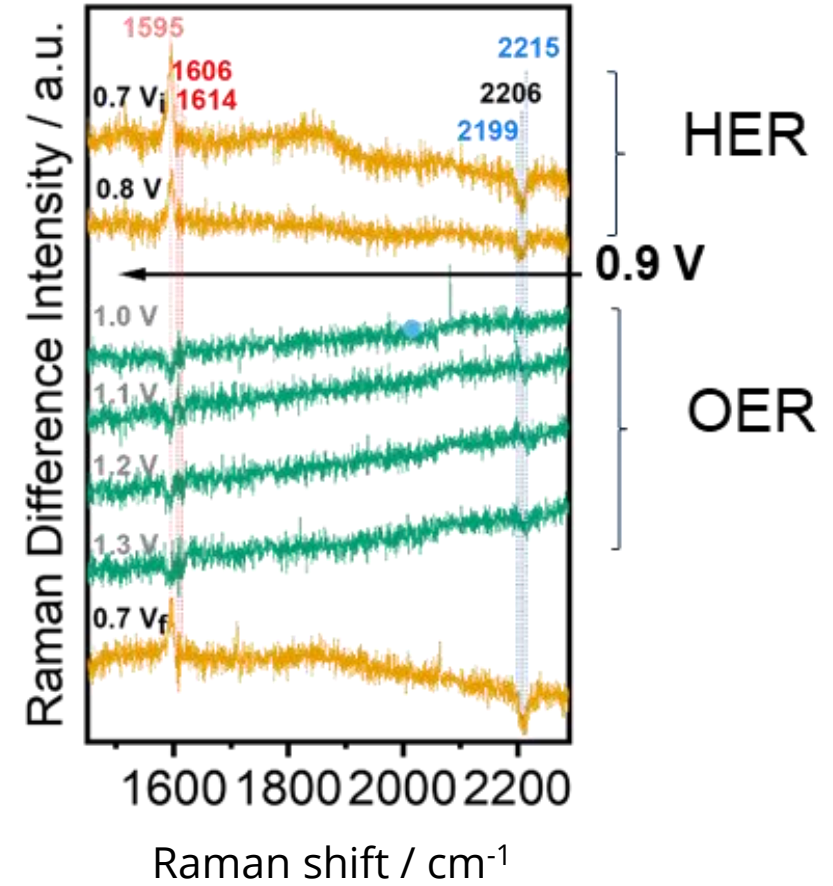
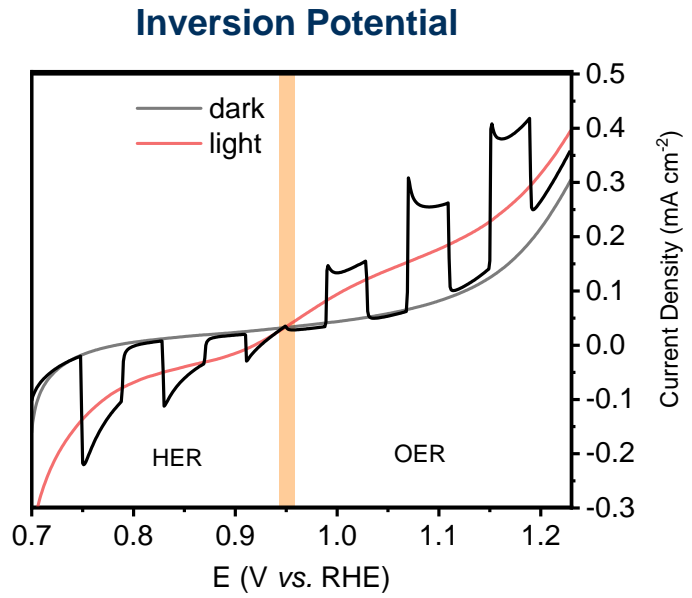
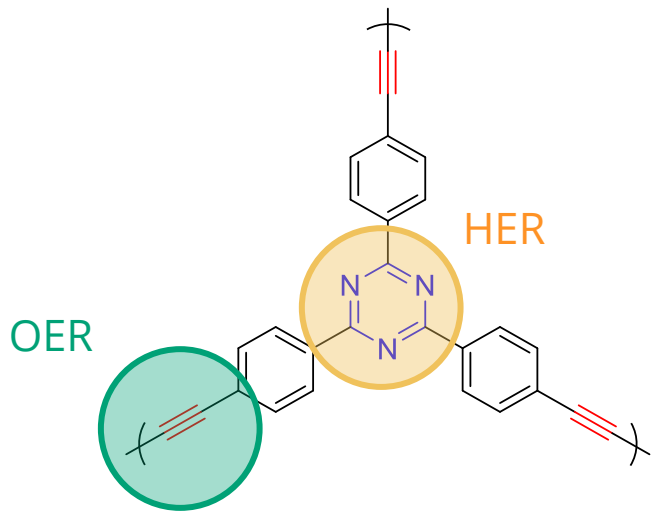
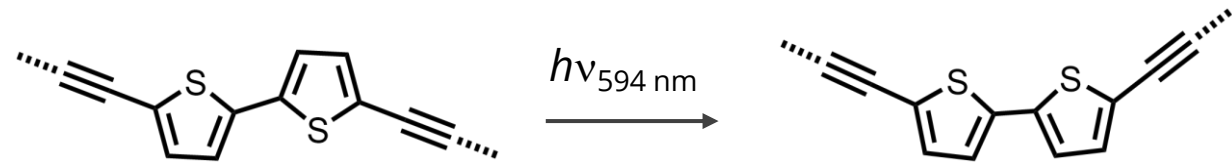
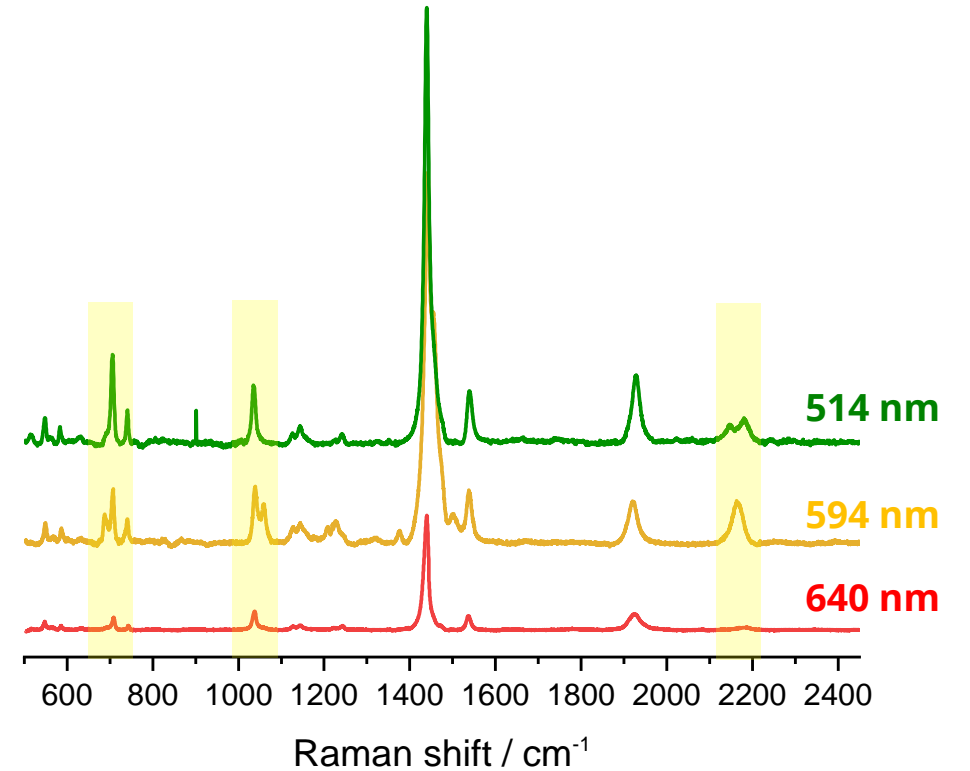
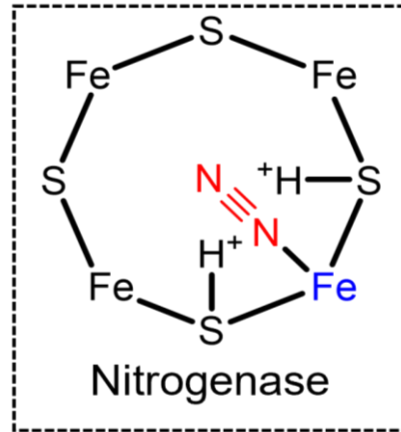
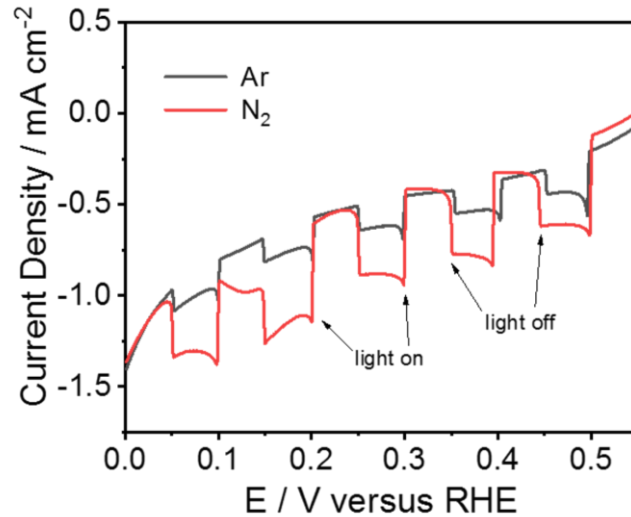
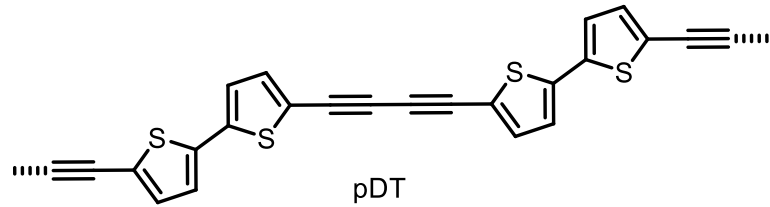
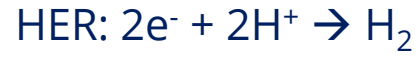


Photo-Electrocatalysis by Acetylenic Polymers



Thanks

AK Electrochemistry

Khoa Ly

Philipp Wollmann

Antje Völkel

Markus Göbel

Anna Maria Dominik

Anthony Ramuglia

Fanny Reichmayr

Linda Feuerstein

Christian Krumbiegel

Stefan Röher

Mino Borelli

Matthias Werheid

Andrea Göpfert

Hussam Alchaar

Phong Ly

Alumni

Fabian Kruse

Robert Götz

Patrycja Kielb

Halil Öner

Xinliang Feng (TU Dresden)

Renhao Dong (TU Dresden)

Stefan Kaskel (TU Dresden)

Agnieszka Kuc (HZDR)

Martin Oschatz (Univ. Jena)

Joachim Heberle (FU Berlin)

Matthias Schwalbe (Utrecht Univ.)

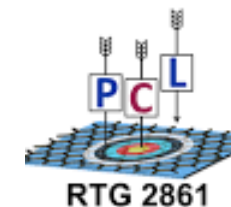
Maria Andrea Mroginski (TU Berlin)

Petkow Petko (Univ. Sofia)

Christin David (Univ. Jena)



Folie 20



Molecular Catalysts with Second Coordination Spheres

Cooperation with M. Schwalbe, Utrecht Univ.

