

Enzyme-like Electrocatalysis of Protein Size Redox Nanoparticles in Two- and threedimensional Assemblies

Zhu, Nan; Ulstrup, Jens; Chi, Qijin

Publication date: 2012

Document Version Publisher's PDF, also known as Version of record

Link back to DTU Orbit

Citation (APA): Zhu, N., Ulstrup, J., & Chi, Q. (2012). Enzyme-like Electrocatalysis of Protein Size Redox Nanoparticles in Twoand three-dimensional Assemblies. Abstract from 63rd Annual Meeting of the International Society of Electrochemistry, Prague, Czech Republic.

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

• Users may download and print one copy of any publication from the public portal for the purpose of private study or research.

- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Enzyme-like Electrocatalysis of Protein Size Redox Nanoparticles in Two- and three-dimensional Assemblies

Nan Zhu, Jens Ulstrup, and Qijin Chi.*

Department of Chemistry and NanoDTU, Technical University of Denmark, DK-2800 Kgs. Lyngby, Denmark. (*E-mail: <u>cq@kemi.dtu.dk</u>)

The development of low-cost, robust and high-efficient nanoscale electrocatalysts is a dream approach to the use of nanomaterials as key building blocks in design and construction of chemical and biological sensing devices as well as fuel cells. Electroactive nanoparticles are a type of nanoparticles that have intrinsic redox activity. One of representative examples is *Prussian Blue* nanoparticles (PBNPs) and their analogues. This presentation will address: (1) synthesis of PBNPs with protein sizes (e.g., 5 nm), (2) two- and three-dimensional assemblies of the nanoparticles, (3) control of electron transport (ET), and (4) features of enzyme-like electrocatalysis. These latest progresses could offer crucial clues for understanding of electronic characteristics, optimization of design of nanoscale electrocatalysts and their applications in sensors.



Fig. 1. Distance-dependent ET kinetics of PBNPs in 2D assembly, clearly showing the feature of tunnelling mechanism.

Fig. 2. High-efficient electrocatalysis toward reduction of hydrogen peroxide with (red) and without (black) PBNPs. Electrolyte: 0.1 M KCl, scan rate: 20 mV s⁻¹.

Acknowledgement: This project is supported in part by the Danish Research Council for Technology and Production Science.