

Technical University of Denmark



## New In-situ electron microscopy methods for studying catalysts, electrocatalyst and other functional materials processes

**Yesibolati, Murat Nulati; Sun, Hongyu; Mølhave, Kristian**

*Published in:*  
Book of Abstracts Sustain 2017

*Publication date:*  
2017

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

[Link back to DTU Orbit](#)

*Citation (APA):*  
Yesibolati, M. N., Sun, H., & Mølhave, K. (2017). New In-situ electron microscopy methods for studying catalysts, electrocatalyst and other functional materials processes. In Book of Abstracts Sustain 2017 [C-9]

**DTU Library**  
Technical Information Center of Denmark

---

### 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.

## New In-situ electron microscopy methods for studying catalysts, electrocatalyst and other functional materials processes

Murat Nulati Yesibolati<sup>1</sup>, Hongyu Sun<sup>1</sup>, Kristian Mølhave\*<sup>1</sup>

1: DTU nanotech

\*Corresponding author email: nuye@nanotech.dtu.dk

Catalysis is a key process for converting reactants into products, and it plays a critical role in chemical and energy conversions, and improving catalysis efficiency is essential to reduce our resource and energy consumption. Better understanding of the dynamic processes during catalyst synthesis and use, with detailed information in structural features like facets and surface defects, particle size variances, composition, supporting substances *etc.* is essential for designing more efficient catalysts. In-situ electron microscopy methods can give direct views of these processes with atomic scale spatial and video rate temporal resolution.

SiNx window based in-situ electron microscopy (shown in Figure 1) make it possible to study processes in liquids or gas.

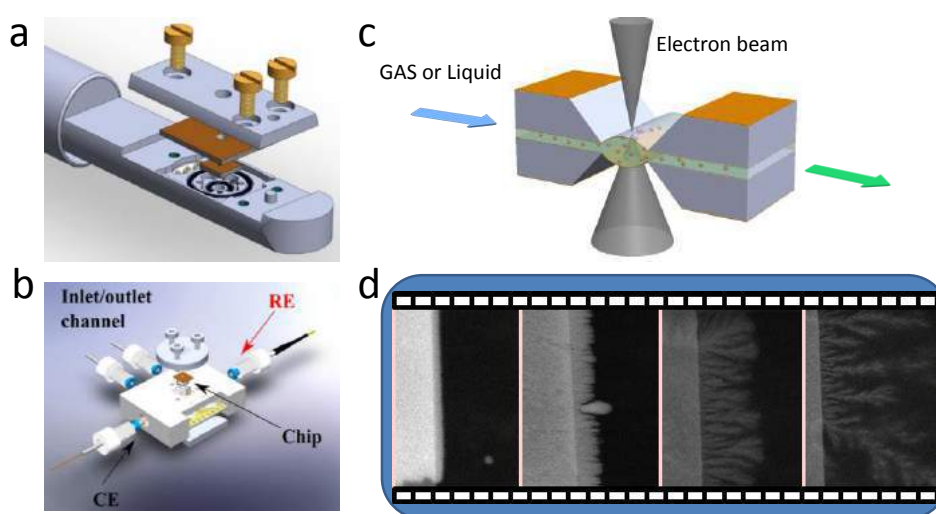


Figure 1, Schematic diagram of a SiNx membrane based chemical/electrochemical cell for catalysis process study, **a**: TEM cell; **b**: SEM cell; **c**: schematic illustration of window region and STEM imaging; **d**: in-situ electrodeposited copper with different morphologies (phosphate tuned) show high formic acid selectivity for CO<sub>2</sub> reduction [1].

[1] J. Zhao, S. Canepa, M. N. Yesibolati, K. Mølhave, Z.C.Xu et al, Phosphate tuned copper electrodeposition and promoted formic acid selectivity for carbon dioxide reduction, *J. Mater. Chem. A*, 2017, 5, 11905