Downloaded from orbit.dtu.dk on: Apr 13, 2021

DTU Library

In situ studies of catalytic soot oxidation by means of Environmental Transmission Electron Microscopy (ETEM)

Simonsen, Søren Bredmose; Dahl, Søren; Johnson, Erik; Helveg, Stig

Publication date:
2008

Document Version
Peer reviewed version

Link back to DTU Orbit

Citation (APA):
Simonsen, S. B., Dahl, S., Johnson, E., & Helveg, S. (2008). *In situ studies of catalytic soot oxidation by means of Environmental Transmission Electron Microscopy (ETEM)*. Abstract from SCANDEM 2008, Lyngby, 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.

In situ studies of catalytic soot oxidation by means of Environmental Transmission Electron Microscopy (ETEM)

Søren B. Simonsen, Søren Dahl, Erik Johnson and Stig Helveg

Haldor Topsøe A/S, Nymøllevej 55, DK-2800 Kgs. Lyngby, Denmark

These years an awareness of health problems associated with soot particles from diesel engine exhaust gas leads to an introduction of diesel particulate filters on heavy vehicles as well as on passenger cars. The overall performance of diesel particulate filter is highly dependent on the kinetics for oxidation of soot deposits. Catalysts are generally used to speed up the oxidation rate of soot. Up to now, a limited number of studies have gained insight into the reaction mechanisms and the role of the catalytic materials by using kinetic reaction studies in combination with characterization of the catalysts [1].

In the present work, we outline recent results from our research that exploit ETEM to directly monitor the catalyzed oxidation of soot at the nano-scale. ETEM has earlier successfully been used in studying carbon growth *in situ* [2]. By using ETEM, we acquire movie sequences, i.e. time-lapse image sequences, at the soot-catalyst interfaces *in situ* during exposure to an oxygen atmosphere at elevated temperatures. The ETEM movies reveal direct insight into the dynamic restructuring processes at or near the soot-catalyst interface during catalyzed soot oxidation. How such ETEM movies provide new kinetic and mechanistic insight into catalytic soot oxidation on a nano-scale will be discussed [3].

1. Krishna K, Bueno-Lopez A, Makkee M, and Moulijn JA, Applied Catalysis B: Environmental **75** (2007) 191
2. Helveg S, López-CartesC, Sehested J, Hansen PL, Clausen BS, Rostrup-Nielsen JR, Abild-Pedersen F, and Nørskov JK, Nature **427** (2004) 426
3. Simonsen S B, Dahl S, Johnson E, Helveg S, Journal of Catalysis 255 (2008) 1