Coarsening of Pd nanoparticles in an oxidizing atmosphere studied by in situ TEM - DTU Orbit (24/12/2018)

Coarsening of Pd nanoparticles in an oxidizing atmosphere studied by in situ TEM

The coarsening of supported palladium nanoparticles in an oxidizing atmosphere was studied in situ by means of transmission electron microscopy (TEM). Specifically, the Pd nanoparticles were dispersed on a planar and amorphous Al₂O₃ support and were observed during the exposure to 10 mbar technical air at 650 °C. Time-resolved TEM image series reveal that the Pd nanoparticles were immobile and that a few percent of the nanoparticles grew or shrunk, indicating a coarsening process mediated by the Ostwald ripening mechanism. The TEM image contrast suggests that the largest nanoparticles tended to wet the Al₂O₃ support to a higher degree than the smaller nanoparticles and that the distribution of projected particle sizes consequently broadens by the appearance of an asymmetric tail toward the larger particle sizes. A comparison with computer simulations based on a simple mean-field model for the Ostwald ripening process indicates that the observed change in the particle size distribution can be accounted for by wetting of the Al₂O₃ support by the larger Pd nanoparticles.

General information
State: Published
Organisations: Department of Physics, Experimental Surface and Nanomaterials Physics, Center for Individual Nanoparticle Functionality, Haldor Topsoe AS, Chalmers University of Technology
Contributors: Simonsen, S. B., Chorkendorff, I., Dahl, S., Skoglundh, M., Helveg, S.
Number of pages: 6
Pages: 278-283
Publication date: 2016
Peer-reviewed: Yes

Publication information
Journal: Surface Science
Volume: 648
ISSN (Print): 0039-6028
Ratings:
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Scopus rating (2017): CiteScore 1.87 SJR 0.81 SNIP 0.759
Web of Science (2017): Impact factor 1.997
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 1.85 SJR 0.746 SNIP 0.834
Web of Science (2016): Impact factor 2.062
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): CiteScore 1.85 SJR 0.747 SNIP 0.804
Web of Science (2015): Impact factor 1.931
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): CiteScore 1.81 SJR 0.818 SNIP 0.864
Web of Science (2014): Impact factor 1.925
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): CiteScore 1.72 SJR 0.829 SNIP 0.781
Web of Science (2013): Impact factor 1.87
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): CiteScore 1.91 SJR 1.096 SNIP 0.878
Web of Science (2012): Impact factor 1.838
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1