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In situ characterization of cerium oxide on Au(111) under reducing and oxidizing conditions by low-energy electron microscopy — •Rudi Tschammer[1], Lars Buss[1,2], Carlos Morales[1], Sanjaya Senanayake[3], Jens Falta[2,4], and Jan Ingo Flege[1] — [1]Applied Physics and Semiconductor Spectroscopy, BTU Cottbus-Senftenberg, Cottbus, Germany — [2]Institute of Solid State Physics, University of Bremen, Bremen, Germany — [3]Chemistry Division, Brookhaven National Laboratory, Upton, NY 11973, USA — [4]MAPEX Center for Materials and Processes, University of Bremen, Bremen, Germany

The development of novel catalysts for a variety of applications is a key challenge for modern catalysis. Inverse metal oxide catalysts consisting of oxide nanoparticles dispersed on a metal support have recently attracted much attention, showing higher activity and selectivity compared to traditional catalytic systems, harnessing synergistic effects attributed to the so-called metal-support interaction. To gain further insights, we deposited cerium oxide nanoparticles on Au(111) and studied this system by low-energy electron microscopy (LEEM) and low-energy electron diffraction (LEED). The prepared samples demonstrate a distinct correlation between the deposition temperature and the structural order of the nanoparticles. This has been expanded upon by exploring the changes induced by reduction with H_2 and reoxidation with O_2 or CO_2, again exhibiting a connection between structural order and activity, while also showing the influence of the oxide-metal interaction on the stability of cerium oxide under reducing conditions.

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