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# Behavior of high-temperature-deposited $CeO_x$/Au(111) under reducing and oxidizing conditions

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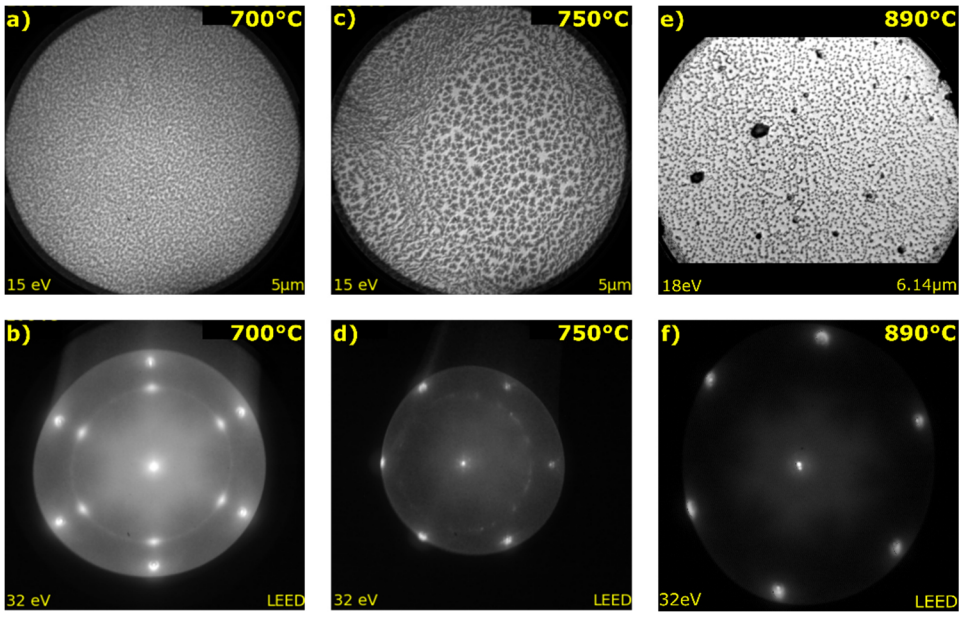
One of the most pressing challenges of modern catalysis is the development of new and improved catalysts to tackle a multitude of problems connected to the extensive use of fossil fuels and the resulting influence on global climate. In recent years, inverse metal-oxide catalysts consisting of oxide nanoparticles distributed on a metal support have received substantial research interest due to their beneficial properties such as high activity and selectivity compared to their conventional metal-oxide counterparts. This has been partly attributed to synergistic interactions between the metal and oxide constituents, so a detailed understanding of these effects is needed for rational and efficient catalyst design. In this study, we have explored the growth of cerium oxide nanoparticles on the Au(111) surface in situ and in real-time using low-energy electron microscopy (LEEM) and low-energy electron diffraction (LEED). An overview of the LEEM (a), c) & e)) and LEED (b), d) & f)) of $CeO_x$/Au(111) grown at different temperatures can be seen in the figure below. An explicit correlation between the deposition temperature and the structural properties of the oxide particles has been observed. Furthermore, the changes induced by the exposure to oxidizing and reducing gases under different conditions have been investigated. Comparing the behavior of cerium oxide nanoparticles grown on different substrates will allow first conclusions on the influence of the oxide-metal interaction on the structure and reactivity of the oxide nanoparticles.

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