

## Contribution submission to the conference Dresden 2026

**Heteroepitaxial growth of  $\text{Sm}_2\text{O}_3$  nanoislands on Cu(111)** —  
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Doping of  $\text{CeO}_2$  with samarium can significantly influence its redox behavior by promoting the formation and stabilization of reduced  $\text{Ce}^{3+}$  species. Yet, studies of well-defined samaria model systems grown on single-crystal surfaces are scarce, leading to a lack of combined structural and spectroscopic studies and, hence, a gap in understanding the relationship between samaria's structure and its chemical behavior. We have investigated hexagonal and monoclinic  $\text{Sm}_2\text{O}_3$  nanoislands grown on Cu(111) using a multi-method approach with high structural and chemical sensitivity, employing low-energy electron microscopy (LEEM), micro-spot diffraction ( $\mu\text{LEED}$ ) and intensity-voltage LEEM in combination with X-ray absorption spectroscopy photoemission electron microscopy (XAS-PEEM). To study the influence of different structures and phases on the chemical behavior of  $\text{Sm}_2\text{O}_3$  islands, we have examined their redox properties under reducing ( $\text{H}_2$ ) and oxidizing ( $\text{O}_2$ ) conditions. The results indicate a highly dynamic system that can be readily adjusted by varying the conditions during deposition, such as growth temperature and oxygen partial pressure.

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