

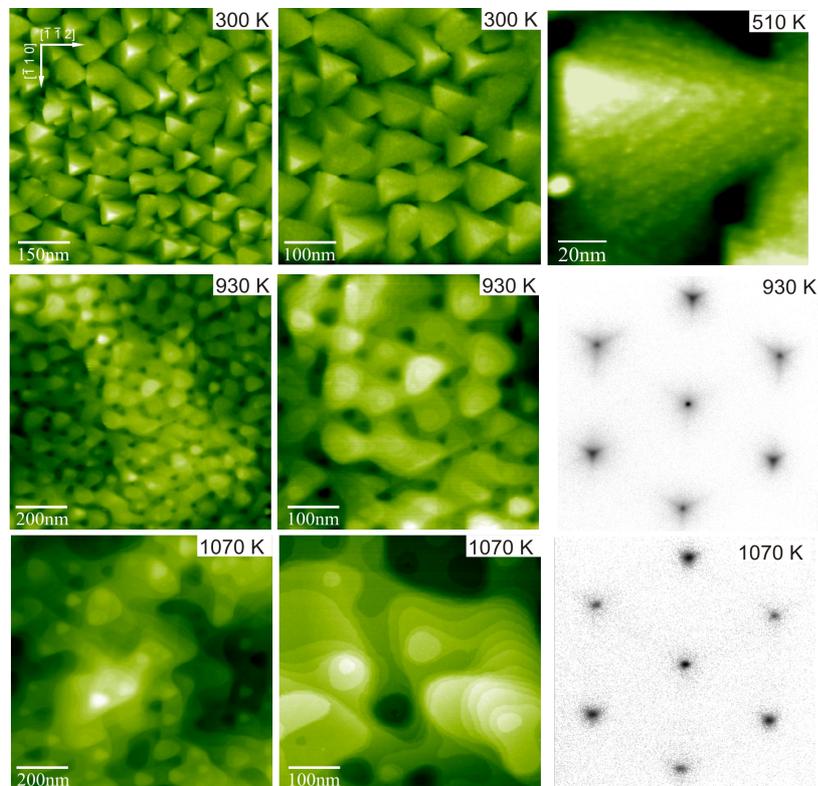
NC-AFM surface study of ceria grown on Si(111)

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A 180 nm thick film of ceria grown on Si(111) with a Pr₂O₃ buffer layer [1] is studied with non-contact atomic force microscopy (NC-AFM) and Kelvin probe force microscopy (KPFM). The film is prepared by annealing to different temperatures in the ultra-high vacuum. Up to a temperature of 845 K, pyramidal, terraced triangular structures are observed. In a temperature range from 515 K to 780 K, 6 to 12 nm high spikes appear between the triangle structures. After annealing, the film to 930 K and higher temperatures flat terraces and step structures develop on the film surface that are similar to structures observed on CeO₂(111) surfaces of bulk crystals. The structural transformation is confirmed by a high resolution low energy electron diffraction experiments combined with spot profile analysis (SPA-LEED). Sputtering the ceria film and annealing at 1090 K generates the best result with large terraces and well defined step structures [2]. Terraces are not atomically flat and KPFM measurements reveal a negative local potential at step edges and potential variations on terraces what is in strong contrast to results found on surfaces of bulk ceria crystals [2].



References

- [1] M. H. Zoellner *et al.*, Phys. Rev. B **85**, 035302 (2012).
- [2] H. H. Pieper *et al.*, Phys. Chem. Chem. Phys. **14**, 15361 (2012).