In Situ Scanning Tunneling Microscopy on ZnO(10-10)

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The increasing need for alternative transportation fuels and energy storage methods has motivated research into methanol as an energy storage chemical. Storing methanol is less complex and safer than storing hydrogen. When needed the energy can be harvested by converting the methanol to hydrogen via methanol steam reforming:

$$CH_3OH + H_2O \rightarrow 3\ H_2 + CO_2$$

The industrial catalyst for methanol synthesis Cu-ZnO/Al_2O_3 shows significant activity for methanol steam reforming and has been researched extensively as a powder catalyst [1,2]. The zinc oxide is not simply a support but plays a significant role in the selectivity of the catalyst [3]. To shed light on the interaction of zinc oxide on the atomic level with the reactants and products, better-defined surfaces and high-resolution imaging techniques are needed. Our set-up [4] allows for the controlled preparation and characterization of model catalyst surfaces in ultra-high vacuum combined with scanning tunneling microscopy at atmospheric pressures and elevated temperatures. Here we present results on the stability of the ZnO(10-10) face in such environments.

References:
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