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Adsorption of Atomic Hydrogen on ZnO Single Crystal Surfaces: A Study on the Impact of Surface Structure

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The interaction of hydrogen with ZnO single crystal surfaces, ZnO (0001), ZnO (000-1), and ZnO (10-10) has been investigated using temperature programmed desorption (TPD) and X-ray photoelectron Spectroscopy (XPS) techniques. When the ZnO single crystal surfaces are exposed to atomic hydrogen at 200 K, all three surfaces show hydrogen desorption at 450 K. ZnO (0001) surface shows hydrogen desorption feature at ~ 260 K as the hydrogen exposure is increased. The ZnO (10-10) surface shows low-temperature desorption feature first and the high-temperature desorption feature appears as the hydrogen exposure increases. The ZnO (000-1) surface does not show any lower temperature hydrogen desorption. We will report the adsorption configuration of hydrogen atoms on ZnO single crystal surfaces with different surfaces structures.

Keywords: adsorption, ZnO surfaces, diffusion, TPD