Observation of the Dynamical Change in a Water Monolayer Adsorbed on a ZnO Surface

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A combined scanning tunneling microscopy and density-functional theory (DFT) study shows a rich structure of water monolayers adsorbed on ZnO($10\bar{1}0$) at room temperature. Most of the water is in a lowest-energy configuration where every second molecule is dissociated. It coexists with an energetically almost degenerate configuration consisting of a fully molecular water monolayer. Parts of the layer continuously switch back and forth between these two states. DFT calculations reveal that water molecules repeatedly associate and dissociate in this sustained dynamical process.

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