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# State-selective Dissociation of Water Molecules on MgO Films Using LT-STM

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The interaction of water molecules with solid surfaces has been a subject of considerable interests, due to its importance in the fields from atmospheric and environmental phenomena to biology, catalysis and electrochemistry [1,2]. Among various kinds of surfaces, a lot of theoretical and experimental studies have been performed regarding water on MgO(100), however, to date, there has been no direct observation of water molecules on MgO by scanning tunneling microscope (STM) as compared with those on metal surface. Here, we will present the direct observation and manipulation of single water molecules on ultrathin MgO(100) films using low-temperature scanning tunneling microscope (LT-STM) [3]. Our results rationalize the previous theoretical predictions of isolated water molecules on MgO including the optimum adsorption sites and non-dissociative adsorption of water. Moreover, we were able to dissociate a water molecule by exciting the vibrational mode of water, which is unattainable on metal surfaces. The enhanced residual time of tunneling electrons in molecules on the insulating film is responsible for this unique pathway toward dissociation of water.

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