**Water adsorption on Nb:SrTiO3(001)/BaTiO3(001): influence of the temperature and UV irradiation**

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Photocatalytic water splitting is a promising approach to transform solar energy into hydrogen. Ferroelectric materials have drawn considerable attention due to their ability to exhibit an internal electric field which could overcome the wrong conduction band alignment of common catalysts.

In order to improve the conversion rate of the reaction, it is necessary to properly understand the adsorption processes taking place on the surface of such materials. BaTiO3 is a commonly used perovskite to study ferroelectricity. However, the comprehension of the behavior of water adsorption on this surface is not yet mastered.

In this work, water adsorption on BaTiO3(001) thin films deposited on Nb:SrTiO3(001) was studied by photoemission spectroscopy using synchrotron radiation which allowed us to have more surface sensitive information. The influence of the temperature and UV irradiation were investigated.

Among the results, we show that water first dissociates into hydroxyl groups until a limit coverage is reached. Interestingly, molecular water adsorption is only possible when the hydroxylation of the surface is sufficient. Moreover, UV excitation seems to increase water adsorption which is also favored by low temperatures.

DFT calculations were conducted as well to further understand the adsorption processes. These calculations tend to confirm that hydroxylation of the surface is needed to promote molecular adsorption.