

Visualization of hydrogen-bond dynamics : water-based model systems on a Cu(110) surface

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Abstrak

This book addresses the direct imaging of hydrogen-bond dynamics within water-based model systems assembled on a metal surface, using a scanning tunneling microscope (STM). The dynamics of individual hydrogen bonds in water clusters, hydroxyl clusters, and water-hydroxyl complexes are investigated in conjunction with density functional theory. In these model systems, quantum dynamics of hydrogen bonds, such as tunneling and zero-point nuclear motion, are observed in real space. Most notably, hydrogen atom relay reactions, which are frequently invoked across many fields of chemistry, are visualized and controlled by STM. This work presents a means of studying hydrogen-bond dynamics at the single-molecule level, providing an important contribution to wide fields beyond surface chemistry.