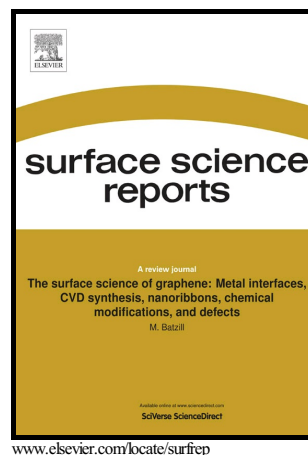


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Use of Molecular Beams for Kinetic Measurements of Chemical Reactions on Solid Surfaces

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Abstract

In this review we survey the contributions that molecular beam experiments have provided to our understanding of the dynamics and kinetics of chemical interactions of gas molecules with solid surfaces. First, we describe the experimental details of the different instrumental setups and approaches available for the study of these systems under the ultrahigh vacuum conditions and with the model planar surfaces often used in modern surface-science experiments. Next, a discussion is provided of the most important fundamental aspects of the dynamics of chemical adsorption that have been elucidated with the help of molecular beam experiments, which include the development of potential energy surfaces, the determination of the different channels for energy exchange between the incoming molecules and the surface, the identification of adsorption precursor states, the understanding of dissociative chemisorption, the determination of the contributions of corrugation, steps, and other structural details of the surface to the adsorption process, the effect to molecular steering, the identification of avenues for assisting adsorption,

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