

Seminar

Understanding elementary chemical processes on surfaces using molecular beam - surface scattering experiments

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In this talk I will describe some general ideas regarding how a molecule exchanges translational, rotational and vibrational energy when it collides with a metal surface, a fundamentally important step in surface chemistry. I will highlight the role of electron-hole pair mediated energy transfer process, which presents major a challenge for theoretical studies.

This will be discussed in the context our recent work based on quantum-state resolved inelastic scattering experiments of CO, HCl from Au(111) and N2 from Pt(111) surface [1, 2, 3]. Our recent work on activated chemisorption of HCl on Au(111) surface [4], where we find that the state of art, six-dimensional quantum dynamic simulations severely overestimate reaction probabilities when compared to experiments, will also be discussed.

Further, I'll also provide an overview of the current understanding of the dynamics of surface chemical reactions, showcasing some recent advances. Subsequently, a novel experimental strategy using the tools of ion imaging, molecular beams and laser spectroscopy to study the desorption of product molecules in a quantum-state resolved manner will be described. Complementary to the desorption studies, an experimental strategy for the study of quantum-state selected chemisorption will also be discussed. Advances in understanding the dynamics of bond breaking/making, energy transfer, structure and energetics of the transition state anticipated to arise from these studies will be highlighted.

Tuesday, Aug 23rd 2016 4:00 PM (Tea/Coffee at 3:45 PM) Seminar Hall, TCIS