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Application of Strong VUV Light Sources in Chemical Dynamics Research

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Abstract

Strong VUV light sources are essential in the study of chemical reaction dynamics because of it potential for highly sensitive and high resolution detection of atomic, molecular and radical species through VUV ionization detection. In this work, I will provide a brief overview in the applications of various VUV light sources in the study of chemical reactions research in our laboratory during the last decade or so. State-to-state molecular beam scattering is a powerful probe to the dynamics of elementary chemical reactions. During the last few years in our laboratory, we have employed the high resolution H atom Rydberg tagging technique through VUV excitation to investigate elementary chemical reactions at the full quantum state resolved scattering level. We will present the results obtained in our laboratory in the last few year on a few benchmark elementary chemical reactions using this powerful method. Results on several important chemical systems will be reviewed here,
 Photodissociation of H2O: Direct and conical intersection dynamics ,
 The O(1D) + H2 reaction: State-to-state picture of insertion chemistry
 The H+H2 reaction system: Dynamics of quantized transition states ,
 The F+H2 reaction system: Dynamics of reaction resonances ,
The discussion of the experimental results will be made in combination with theoretical results on these bench mark systems. In addition, I will discuss new developments of VUV light sources for chemistry and chemical dynamics research.

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