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Control of the Photodissociation of Molecules Adsorbed at Metal Surfaces

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This talk will discuss aspects of molecular photo- and electron- dissociation physics applied at material interfaces. We have studied several molecular systems that have well-known properties in the gas-phase phase to understand how the molecular properties are modified and can be controlled at the solid–vacuum interface. In the first instance we show how molecular orientation in a 2-D surface phase can be exploited to help understand the photodissociation dynamics of CH₃I in the near-UV range, and how the dissociation processes are modified near a metal surface. In the second instance we describe recent experiments on low energy dissociative electron attachment (DEA) of several halogenated molecules, and show how particular surface electron states (image states) can be used as an effectively monochromatic electron source to initiate DEA of the target molecules, using either photoelectrons from the metal surface or low energy electrons from an external source.