

## The dissociation probability of H<sub>2</sub> on Ru(0001)

It is important to understand the interaction between gas phase molecules and the ruthenium surface as a matter of fundamental interest and industrial importance. Ruthenium may be used as a catalyst for ammonia production from N<sub>2</sub> and H<sub>2</sub>. In order to understand the mechanism, as a first step the dissociation probability of H<sub>2</sub> on Ru (0001) was studied. We use a supersonic molecular beam to control the kinetic energy of H<sub>2</sub> impinging on the surface at different incident angles. Time-of-flight spectrometry reveals the kinetic energy of the molecules while the King & Wells technique allows us to quantify the dissociation probability. Our results indicate that current theoretical approaches using density functional theory cannot quantitatively describe our results. This indicates that the interaction between hydrogen and simple metal surfaces is not completely understood. Notably the role of electronic excitations of the surface may explain the differences between theory and experiment.