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#### Hyperthermal $\text{Cs}^+$ -Surface Reactive Scattering for Real-time Measurement of Molecular Adsorption. Reaction of CO, $\text{H}_2\text{O}$ , and $\text{C}_6\text{H}_6$ with Ni(100)

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Secondary ion mass spectrometry (SIMS) is a sensitive analytical tool for the detection of monolayers on surfaces. Interpretation of the mass spectra in terms of the chemistry and structure of the surface, however, is a much more difficult problem. In order to effectively utilize the spectral information, one needs to understand the process of molecular ion ejection in terms of the nuclear motion of the lattice atoms induced by the primary ion, and also to incorporate the mechanism and the probability of the ionization of the ejecting particles into the dynamic process. The situation can be much simplified if one employs hyperthermal  $\text{Cs}^+$  ion as a primary ion.  $\text{Cs}^+$  does not easily become neutralized during the surface collision. Fragmentation of the molecular adsorbates is much reduced during hyperthermal collision. Due to the heavy mass of the projectile, collision energy can be efficiently utilized for adsorbate desorption. We report in this presentation that molecular adsorbates can be detected by hyperthermal  $\text{Cs}^+$  ion-surface reactive scattering. Upon collision of  $\text{Cs}^+$  with the the Ni(100) surfaces reacted with CO,  $\text{H}_2\text{O}$ , and  $\text{C}_6\text{H}_6$  at room temperature,  $\text{Cs}^+$  picks up the surface adsorbates and forms  $\text{CsCO}^+$ ,  $\text{CsOH}^+$ , and  $\text{CsC}_6\text{H}_6^+$  ions, respectively. These  $\text{CsX}^+$ -type ions reflect molecular state of the surface adsorbed species. Multichannel monitoring of the scattered ions in a time domain enables us to follow the kinetics of competitive adsorption of CO, OH, and  $\text{C}_6\text{H}_6$  in real-time.