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Photooxidation Dynamics of Model Ketones and Alcohols on TiO_2(110)[1] MATTHEW KERSHIS, DANIEL WILSON, Stony Brook University, MICHAEL WHITE, Stony Brook University/Brookhaven National Laboratory —
The photooxidation dynamics of model ketones and alcohols on TiO_2(110) were studied using pump-probe laser spectroscopy under UHV conditions. Butanone photooxidation was chosen as a model reaction to demonstrate a fast ion imaging system using pixel imaging mass spectrometry (PImMS). Butanone photooxidation proceeds via ejection of both an ethyl and methyl radical. In the former case, multiple species are observed in product mass spectra which previous studies have shown are the result of ethyl radical fragmentation due to dissociative ionization. Results obtained using this imaging technique agree with previous work and demonstrate the utility of this technique in elucidating fundamental surface photochemical mechanisms. Results from the study of ethanol and isopropanol photooxidation on this surface will also be presented. These results show that methyl radicals are ejected during the photooxidation of these molecules. Comparison of methyl radical final state distributions measured here with those obtained for acetaldehyde and acetone photooxidation indicate that methyl radicals are produced as secondary photoproducts following the photooxidation of the primary aldehyde-ketone photoproducts.

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