Measuring Site Specific Kinetics on Catalytic Metal Surfaces using Ion Imaging

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Abstract

I will introduce how to apply slice ion imaging to study the dynamics and kinetics of reactions on surfaces. The first demonstration involves the study the site specific oxidation of CO on Pt(111) and Pt(332) crystals. This new method allows for measurements of the "true kinetic traces" i.e., CO_2 product flux vs. reaction time. Because the symmetry and orientation of the active site strongly influences the speeds and desorption angles of newly formed products, we are able to identify for the first time, the elementary reactions steps and extract the respective rate constants (activation energies and prefactors) for this benchmark reaction of heterogeneous catalysis, thus settling open questions that spanned more than 3 decades.