

Abstract Submitted
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Inelastic neutron scattering (INS) studies of hydrogen spillover on pure and Pd decorated metal oxides JOHN Z. LARESE, SOURAV ADAK, NICHOLAS STRANGE, University of Tennessee, TILO SEYDEL, Institute Laue Langevin, CHUCK SUMNER, Eastman Chemical Co., LUKE DAEMEN, LANL — Recent INS and quasielastic neutron scattering (QENS) measurements of the interaction of H₂ with pure and metal decorated metal oxides (MOs) will be discussed. These materials find widespread use as energy materials e.g. as oxidation and hydrogenation catalysts. These studies are aimed at revealing the microscopic details of the process(es) that underlie “hydrogen spillover” to identify what, if any, role it plays in the catalytic cycle. Hydrogen spillover refers to the diffusion of hydrogen from a surface capable of disassociating H₂, onto an adjoining surface. This diffusing hydrogen may possess an electron capable of pairing with an unpaired free radical electron on an adjacent surface. Many catalysts consist of nm sized metal clusters supported on high surface area MOs and many catalytic reactions involve hydrogen. Recent INS observations show surface OH formation on MOs supports occurs only when the metal catalyst is present even at low temperatures. Spectral signatures in both the rotational and vibrational portions of the INS signals underscore this behavior. QENS data establishes that translational diffusion is significant at T < 40 K. Behavior on various support materials will be highlighted.

John Z. Larese
University of Tennessee

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