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New Approaches for Understanding of Hydrogen Interaction with Graphene, Graphene Hydroxide, and Lithiated Graphene SOURAV ADAK, University of Tennessee, LUKE DAEMEN, MONIKA HARTL, ALICE SMITH, Los Alamos National Laboratory, DANIELE PARADISO, University of Milan, NICHOLAS STRANGE, GEORGE THOMAS, J.Z. LARESE, University of Tennessee, UNIVERSITY OF TENNESSEE TEAM, LOS ALAMOS NATIONAL LABORATORY COLLABORATION — A combination of solid state NMR, neutron vibrational spectroscopy, and volumetric adsorption isotherms have been employed to characterize graphene, hydroxylated graphene, and lithium incorporated graphene and the interaction of molecular hydrogen with them. Recent synthetic activities have produced materials with unique properties and when coupled with our ssNMR measurements the results shed some new light on the surface chemical composition of these materials and the role they play in the hydrogen storage capacity. Graphene is found to have significantly higher hydrogen uptake than graphite and randomly oxidized graphite sheets (graphite oxide). Inelastic neutron scattering (INS) provides direct information concerning hydrogen dynamics. We have used INS to examine how the interaction of hydrogen changes when the graphene surface chemistry changes or when lithium is incorporated at the interface.

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