Abstract Submitted for the MAR15 Meeting of The American Physical Society

Catalytic hydrogenation of cresol: first-principles densityfunctional calculations and *ab initio* molecular dynamics simulations¹ YAPING LI, Department of Physics and Engineering Physics, University of Tulsa, ZHIMIN LIU, FRIEDERIKE JENTOFT, School of Chemical, Biological and Materials Engineering, University of Oklahoma, SANWU WANG, Department of Physics and Engineering Physics, University of Tulsa — Biomass is an important renewable energy resource. Cresol is one of components in crude bio-oil generated from biomass, and hydrogenation of cresol is often involved in the upgrading process. We studied catalytic hydrogenation of cresol on the Pt(111) surface with and without the presence of water. In particular, we used first-principles density-functional theory and *ab initio* molecular dynamics simulations to obtain adsorption geometries, binding energies, reaction energies, activation energies, and reaction pathways for hydrogenation of cresol with possible products of 2-methylcyclohexanone and 2-methylcyclohexanol. Our theoretical results are used to explain the available experimental measurements, which show a strong influence of water.

¹Supported by DOE (DE-SC0004600). This research used the supercomputer resources at NERSC, of XSEDE, at TACC and at the Tandy Supercomputing Center.

> Yaping Li Department of Physics and Engineering Physics, University of Tulsa

Date submitted: 13 Nov 2014

Electronic form version 1.4