Abstract Submitted
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Parahydrogen Induced Polarization Reactions on Supported Metal Nanoparticle Catalysts[1] CLIFFORD BOWERS, RONGHUI ZHOU, WEI CHENG, LUKE NEAL, HELENA HAGELIN-WEAVER, Univ of Florida - Gainesville — ALTADENA type parahydrogen induced polarization (PHIP) signals were acquired using various oxide (e.g. Al_2O_3, TiO_2) supported Pt and Ir nanoparticle catalysts in the hydrogenation of small alkenes. The hydrogenation reactions were performed using a home-built mini-reactor installed on top of a 9.4 Tesla superconducting NMR magnet. Precise control of the gas mixture (i.e. alkene, para-H_2 and carrier gas) was achieved using mass flow controllers. Hyperpolarized adducts were delivered down the magnet bore from the reactor to the NMR probe for NMR detection. For certain substrates, long-lived hyperpolarized states were generated and detected. The PHIP signal enhancement and pairwise H_2 addition selectivity was measured as a function of the reactant partial pressures and reaction temperature. Activation energies and reaction kinetics were obtained for both pairwise and random addition. The reaction conditions and metal nanoparticle characteristics favoring pairwise selectivity were thus identified.

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