Catalytic Effects of Supported Pd Catalysts Having Different Surface Characteristics on Dehydrogenation of 2-[(*n*-Methylcyclohexyl)methyl]piperidine as the Liquid Organic Hydrogen Carrier

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Liquid Organic Hydrogen Carrier (LOHC) technology is considered as one of the promising means for safely storing and transporting hydrogen. Recently, 2-(n-methylbenzyl)pyridine (H_0-MBP) has been designed and synthesized. The perhydro product (i.e., 2-[(n-methylcyclohexyl)methyl]piperidine (H_{12}-MBP)) is a highly stable liquid that can be delivered to demand sites where it can release H_2 via catalytic dehydrogenation. Here, we investigated the effect of the metal oxide supports on the surface characteristics of supported Pd catalysts and their catalytic performances during H_2 release from H_{12}-MBP via catalytic dehydrogenation. Various types of Pd-supported metal oxides (Al_2O_3, CeO_2, TiO_2, ZrO_2, and SnO_2) were synthesized and their differences in acidity, reducibility, and strength of metal-support interaction to Pd metal nanoparticles resulted in the property changes in supported Pd catalysts and thus their catalytic performances during dehydrogenation of H_{12}-MBP.