A POTENTIAL N-HETEROCYCLIC BASED LIQUID ORGANIC HYDROGEN CARRIERS

Mirae Ra[a,b], Kwanyong Jeong[a], Soomin Kim[a,b], Jinhee Lee[a], Taesun Chang[a,b], and Jihoon Park[a,b]

[a]Center for Environment & Sustainable Resources,
Korea Research Institute of Chemical Technology, Daejeon, Korea
[b]Department of Advanced Materials & Chemical Engineering,
University of Science & Technology, Daejeon, Korea

Liquid Organic Hydrogen Carriers (LOHCs) are regarded for large scale hydrogen storage, which are reversibly hydrogenated and dehydrogenated using the noble metal catalysts [1]. N-heterocyclic compounds have been remarked as promising candidates for the LOHC materials. N-heterocyclic organic compound allows to supply hydrogen at mild conditions efficiently [2]. Herein, we report a novel pyridine based compound is chemically stable in consecutive cycle with a hydrogen content of above 6.5 wt% and liquids at below zero temperature. The catalytic hydrogenation of the compound was carried out over Ru such as commercially available Ru/Al_2O_3. Dehydrogenation of H_2-rich form of pyridine based organic materials was the most effective on Pd-based catalysts, at 250-270 ^oC. Furthermore, the purity of liberated H_2 was higher than 99%, offering a suitable hydrogen storage capacity.

[1] Preuster, P.; Papp, C.; Wasserscheid, P. Liquid organic hydrogen carriers (LOHCs): toward a hydrogen-free hydrogen economy. *Acc. Chem. Res.* **2017**, *50*, 74-85

[2] Clot, E., Eisenstein, O. & Crabtree, R.H. Computational structure-activity relationships in H_2 storage: how placement of N atoms affects release temperatures in organic liquid storage materials. *Chem. Commun*. **2007**, 2231-2233