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Hydrodeoxygenation of Water-Insoluble Bio-Oil to Alkanes using a Highly Dispersed Pd-Mo Catalyst

Haohong Duan[1], Titipong Issariyakul[2], Juncai Dong[3], Shik Chi Edman Tsang[4], Dermot O'Hare[1]*

[1]Chemistry Research Laboratory, Department of Chemistry, University of Oxford, 12 Mansfield Road, Oxford, OX1 3TA, UK,[2]Product & Technology Development Center, SCG Packaging Public Company Limited, 19 Moo 19 Seang-Xuto Road, ThaPha BanPong Ratchaburi, 70110, Thailand, [3]Beijing Synchrotron Radiation Facility, Institute of High Energy Physics, Chinese Academy of Sciences, 19B Yuquan Road, Shijingshan District, Beijing 100049 China. [4]The Wolfson Catalysis Centre, Department of Chemistry, University of Oxford, Oxford OX1 3QR, UK.

*e-mail: dermot.ohare@chem.ox.ac.uk

Abstract:

Bio-oil, produced by the destructive distillation of cheap and renewable lignocellulosic biomass, contains high energy density oligomers in the water-insoluble fraction that can be utilised for diesel and valuable fine chemicals productions. We have developed an efficient hydrodeoxygenation (HDO) catalyst that combines highly dispersed palladium and ultrafine molybdenum phosphate nanoparticles on silica. Using phenol as a model substrate this catalyst is 100% effective and 97.5% selective for hydrodeoxygenation to cyclohexane under mild conditions in a batch reaction, this catalyst also demonstrates regeneration ability in long-term continuous flow tests. Detailed investigations into the nature of the catalyst shows it combines hydrogenation activity of Pd, high both Brønsted and Lewis acid sites, we believe these are key features for efficient catalytic hydrodeoxygenation behaviour. Using a wood and bark derived feedstock, this catalyst performs hydrodeoxygenation of lignin, cellulose and hemicellulose-derived oligomers into liquid alkanes with high efficiency and yield.

References:

1. Duan, H.; Dong, J.; Peng, Y.-K.; Chen, W.; Issariyakul, T.; Myers, W.K. .; Li, M.-J.; Yi, N.; Kilpatrick, A.F.R.; Wang, Y.; Zheng, X.; Chen, D.; Ji, S.; Li, Y.; Buffet, J.-C.; Tsang, S.C.E.; O'Hare D., *Nature Communications*, **2017**, *8*, 591.