Study of Pd nanoparticles and metal-organic framework (MOF) composite as heterogeneous catalyst

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By combining the great catalytic activity of palladium nanoparticles and large surface area and tunable structure of metal-organic frameworks, we have developed a Pd@MIL-101 composite material as a heterogeneous catalyst for the tandem in situ generation of hydrogen from ammonia borane and reduction of various nitro compounds. The catalyst exhibits high activity, selectivity and recyclability. A variety of aliphatic and aromatic nitro compounds with different groups were able to be reduced to the respective primary amines with excellent conversion yields (>99%) in very short reaction times (1.5–5 min). Six consecutive runs of the tandem catalysis result in no discernable loss of catalytic ability, demonstrating the great stability and recyclability of the Pd@MIL-101 catalyst. Compared to other reported reduction systems for nitro compounds, our catalyst does not require stored or pressurized hydrogen and it is therefore not only more efficient but also much safer. The application of Pd@MIL-101 in a number of other organic transformations will also be discussed.

Biography
Zhiyong Wang completed his PhD in Chemistry from Northwestern University and received Post-doctoral studies at University of Pittsburgh and then Texas A&M University. He worked in a number of organic chemistry related areas including enzyme inhibitor design, drug discovery, protein functional studies and applications of metal-organic frameworks. He is currently an Assistant Professor at the Department of Chemistry and Physics at Troy University. He has published more than 20 papers in reputable journals.

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