Transition Metal(0) Nanoparticles as Catalysts in Hydrogen Generation from the Solid Hydrogen Storage Materials

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Over the last decade, transition metal(0) nanoparticles have attracted much attention owing to their unique properties, different to their bulk counterparts, which facilitate their application in different fields from materials science to engineering. Of particular interest, the use of transition metal(0) nanoparticles in catalysis has brought excellent efficiency in terms of activity, selectivity and lifetime to heterogeneous catalysis. This presentation will give a short review of the recent developments in the synthesis routes and the catalytic performance of transition metal(0) nanoparticles in hydrogen generation from the solid hydrogen storage materials, emphasizing the importance of efficient storage of hydrogen that is still one of the key issues in the “Hydrogen Economy”.

Amine boranes can release hydrogen by solvolysis such as hydrolysis and methanolysis in the presence of suitable catalyst. Key examples will be given for hydrogen generation from the hydrolysis or methanolysis of ammonia borane, hydrazine borane and dimethylamine borane catalyzed by transition metal(0) nanoparticles which have been stabilized by using soluble ligand or suitable support such as oxides, porous or layered materials with large surface area.