

Internal Seminar

Carbon nanodot: A competent metal-free nanocatalyst for room temperature hydrogen production with 'on-off' switching

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Positively charged functionalized carbon nanodots (CNDs) with variation of different effective surface area (ESA) are synthesized by cheap and time effective microwave method and applied for the generation of hydrogen via hydrolysis of sodium borohydride. Our observation is that positively charged functional group is essential for the hydrolysis for the hydrogen production but the overall activity is found to be enhanced with ESA. A highest value of $1066 \text{ ml g}^{-1} \text{ min}^{-1}$ as the turnover frequency is obtained which is moderate in comparison to other catalysts. However, the optimum activation energy is found to be $22.01 \text{ kJ mol}^{-1}$ which is comparable to well-known high cost materials like Pt and Ru. All the samples showed good reusability and 100% conversion even after 10th cycle. Effect of H^+ and OH^- is also studied to control the on-board and on-demand hydrogen production ("on-off switching"). It is observed that H_2 production decreases inversely with NaOH concentration and ceases completely when 10^{-1} M NaOH is added. With the addition of HCl, H_2 production can be initiated again that confirms the control over on-off switching.

Monday, Jan 28th 2019

2:30 PM (Tea/Coffee at 2:00 PM)

Seminar Hall, TIFR-H