

Small Molecules for Hydrogen based Energy Storage Systems (H₂-ESS)

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To address the increasing global energy and environmental issues, safe and sustainable energy carriers alternative to carbon based fuels for the current power generation are being continuously investigated. One of the key issues for realizing the “hydrogen economy” is to develop reliable hydrogen storage/release systems that store/release large quantities of hydrogen in a safe and economically viable manner. Small molecules such as carbon dioxide (CO₂), nitrogen (N₂), and aromatic hydrocarbons are potential hydrogen storage media that can store hydrogen as liquid forms with high volumetric H₂ storage capacities, much higher than compressed hydrogen gas. In addition, the hydrogen atoms bonded to these small molecules can be released as H₂ gas in the presence of a proper catalyst. Despite these intriguing hydrogen release properties, highly active and selective heterogeneous catalysts for reversible hydrogen storage and release utilizing small molecules still remain challenges. In this contribution, we present small molecules based hydrogen (energy) storage for different energy applications.