Ammonia as a Promising Hydrogen Carrier for Carbon Neutrality

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To achieve global carbon neutrality in the energy sector, renewable energy should replace the current fossil energy. However, due to its intermittent and unpredictable nature, the renewable energy should be stored and delivered into a desired site for use. Hydrogen is recognized as a promising renewable energy carrier because of its high gravimetric energy storage density. But, the low volumetric energy density of gaseous hydrogen limited its use for different energy applications associated with high capacity and long distance hydrogen transportation. In the regard, an economically viable hydrogen storage system that enables to deliver large quantities of hydrogen in a chemical form has attracted considerable attention. Ammonia has a high volumetric hydrogen storage density of ca. 120 $kg{\cdot}m^{-3}$ and is being mass produced by the Haber-Bosch process. Furthermore, it can be readily transported over long distances using existing infrastructure. Additionally, hydrogen stored in ammonia can be released on demand in the presence of an appropriate catalyst. In the presentation, ammonia based hydrogen storage technology will be introduced.