

Ammonia-A Hydrogen Carrier from Earth Abundant Materials

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As global population and energy consumption continue to increase, it is critical that humankind transitions to renewable resources like solar and wind energy. Because these sources are intermittent, it is essential that the energy be stored so it can be accessed on demand. Except for nuclear fuels, nothing rivals the energy density that can be stored in chemical bonds. Recent advances in photochemical water splitting are making the prospects for renewable hydrogen bright. Because hydrogen is a low-density gas, it is desirable to store it in a more energy dense material. We have targeted liquid ammonia as a hydrogen carrier because (i) it has a high energy density, (ii) it is produced on large scale from hydrogen and nitrogen, the most abundant gas in the atmosphere, and (ii) when oxidized it produces nitrogen and water, leaving no carbon footprint. We are exploring new avenues for synthesizing ammonia and extracting the energy store in its chemical bonds. This talk will outline the problem and discuss the approaches we are taking.