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Study of Ammonia Borane – Polyvinylpyrrolidone Hydrogen Storage Composite Materials[1] SAHITHYA PATI, OZGE GUNAYDIN-SEN, Lamar University — Ammonia borane (NH_3BH_3), a potential hydrogen storage system, reveals a structural phase transition around ˜223 K. The transition mechanism was studied by heat capacity measurements, clearly indicating a first-order transition. When blended with polyvinylpyrrolidone (PVP) the transition quantitates (i.e enthalpy and entropy) exhibited a decrease by increasing the polymer content but still showed the solid-solid phase transition. The decomposition properties of the composites were also conducted via differential scanning calorimeter at high temperatures (300-570 K) to investigate the dehyrogenation kinetics. Various heating rates were used and the activation energies were calculated. The activation energies of the composites were found to be lower than the bulk NH_3BH_3. The decrease in the temperature for the release of hydrogen revealed for the composites indicated the enhanced kinetics. All of these changes could be due to the interaction between PVP and NH_3BH_3 after blending which is also supported by the infrared studies. It also explains the hydrogen release pattern during decomposition at higher temperatures ranging from 350-450 K.

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Sahithya Pati
Lamar University

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