Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Functional Nanofiber Composites of Ammonia Borane for Hydrogen Storage[1] OZGE GUNAYDIN-SEN, KRISHNA KHAREL, RAMANJANEYULU SEEMALADINNE, LAUREN WARE, SUYING WEI, Lamar University — Temperature dependence of thermal and vibrational properties of Ammonia Borane (NH_3BH_3) - polymer (e.g. polyacrylamide, polyethylene oxide) composites (in bulk and electrospun nanofiber forms) was measured to understand the structural phase transition behavior and dehydrogenation response. Heat capacity measurements revealed the first-order solid-solid phase transition at 223 K. The transition was suppressed in nanofiber composites which can be attributed to the disruption of the dihydrogen bonding network due to the fiber formation via electrospinning technique. The thermal quantities decreased with the increase in polymer content for the bulk composites. The interaction between the polymer (O of C=O or C-O bond) and NH_3BH_3 (B of B-N bond) could be the cause of the changes. Variable tempearture infrared studies between 400-4000 cm^{-1} will be discussed to bring insight to this phenomena. Kinetic properties were also investigated to understand the dehydrogenation process between 300-570 K. Activation energies were found to be the smallest for the nanofiber composites reveal the improved kinetics for these new functional materials. The suppression of the unwanted impurities were also supported by the measurements.

[1]This work is supprted by Lamar University and Welch Foundation

Ozge Gunaydin-Sen
Lamar University

Date submitted: 11 Nov 2016 Electronic form version 1.4