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Composition dependence of hydrogen and ammonia release in the lithium-boron-nitrogen-hydrogen quaternary system GREGORY P. MEISNER, MATTHEW L. SCULLIN, FREDERICK E. PINKERTON, MARTIN S. MEYER, MICHAEL P. BALOGH, Materials and Processes Lab and Chemical and Environmental Sciences Lab, General Motors Research and Development Center — The new quaternary hydride in the lithium-boron-nitrogen-hydrogen (Li-B-N-H) quaternary phase diagram forms by the reaction of lithium amide ($LiNH_2$) and lithium borohydride ($LiBH_4$) near the approximate composition $LiB_{0.33}N_{0.67}H_{2.67}$. When heated, the quaternary hydride first melts and then releases greater than 10 wt% hydrogen and a small amount of ammonia (2-3 mole% of the generated gas). We studied hydrogen and ammonia release from the series of reactant mixtures $(LiNH_2)_x(LiBH_4)_{1-x}$ as a function of composition using volumetric, gravimetric, mass spectrometer, and *in situ* x-ray diffraction measurements. We found that maximum hydrogen and minimum ammonia release do occur for x = 0.67. We observe that this composition corresponds to the ternary decomposition end product Li_3BN_2 rather than to the true single phase composition of the quaternary hydride as determined from our single crystal x-ray diffraction measurements.

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