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Doping effect of Nb species on hydrogen desorption properties of AlH_3

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ABSTRACT:

Hydrogen desorption properties of α-AlH_3 doped with Nb species (Nb, Nb_2O_5 and NbF_5) were investigated. Doping Nb species improved the desorption properties of AlH_3. In particular, 1 mol% NbF_5-doped AlH_3 showed the lowest onset desorption temperature at 60 °C. Compared with Nb- or Nb_2O_5-doped AlH_3, the fine distribution of dopant was successfully achieved in NbF_5-doped AlH_3. The apparent activation energy for hydrogen desorption of AlH_3 was slightly decreased with the dopant of NbF_5. The improvement of desorption properties might be due to the finely dispersed Nb and/or AlF_3, which are formed by the reaction between NbF_5 and AlH_3 (surface Al_2O_3).

Keywords: Hydrogen storage; Aluminum hydride, Niobium Fluoride, Niobium oxide, Catalytic effect