Metal Polymer Nanocomposite System for Hydrogen Storage Material Synthesized by Using Supercritical Fluid CO_2

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Magnesium hydride MgH2 has been considered as the most promising material for hydrogen storage because of high hydrogen capacity of more than 7.6 wt%, low cost and abundant resources. However, hydrogen absorption and desorption in this material take place at a high temperature and its kinetics is very slow. Several approaches exist to reduce the sorption temperatures, increase reaction kinetics and improve its cycling ability. Metal polymer nanocomposite systems of MgH2/Ni or Pd/SWCNTs or MWCNTs/Polyaniline are synthesized by using a mixture of supercritical CO2/ethanol (80/20 molar ratio) at temperature 100-150oC and pressure 20-25 MPa with residence time 90-180 minutes. Absorption-desorption analysis temperature and pressure are taken at 150-300oC and up to 3 MPa, 0.1 MPa respectively. The composite material is then characterized by using Transmission Electron Microscopy (TEM), X-Ray Energy Dispersive Spectrometers (EDS), Scanning Electron Microscopy (SEM), X-Ray Diffractometer (XRD) and Brunauer-Emmett-Teller (BET) surface analysis instrument.