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Invited paper – Rapid

Hydrogen storage in sonicated carbon materials

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Abstract. The hydrogen storage in purified single-wall carbon nanotubes (SWNTs), graphite and diamond powder was investigated at room temperature and ambient pressure. The samples were sonicated in 5 M HNO_3 for various periods of time using an ultrasonic probe of the alloy Ti-6Al-4V. The goal of this treatment was to open the carbon nanotubes. The maximum value of overall hydrogen storage was found to be 1.5 wt %, as determined by thermal desorption spectroscopy. The storage capacity increases with sonication time. The sonication treatment introduces particles of the Ti alloy into the samples, as shown by X-ray diffraction, transmission electron microscopy, and chemical analysis. All of the hydrogen uptake can be explained by the assumption that the hydrogen is only stored in the Ti-alloy particles. The presence of Ti-alloy particles does not allow the determination of whether a small amount of hydrogen possibly is stored in the SWNTs themselves, and the fraction of nanotubes opened by the sonication treatment is unknown.