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Synthesis of Carbon-Nanotube Fine-Particles in a Glow-Discharge Plasma and Evaluation of Hydrogen Storage Properties YASUAKI HAYASHI, MASAYOSHI IMANO, YUMI KINOSHITA, YOSHIFUMI KIMURA, YASUHIRO MASAKI, Kyoto Institute of Technology — Nano-carbons, especially single-walled carbon nanotubes (SWNTs), are promising for hydrogen-storage materials in fuel-cell electric vehicle, because it has a large surface area per unit weight. We have developed a new gas phase synthesis method applying an RF glow discharge plasma for the suspension of negatively charged fine particles containing catalytic metal and carbon nanotubes along with hot-filaments, and succeeded to synthesize carbon fine particles including SWNTs in gas-phase. The synthesis process was monitored by the variation of RF self-bias voltage. Hydrogen storage property of our synthesized carbon fine-particles was evaluated by thermal-desorption spectroscopy to show the desorption of physisorbed hydrogen molecules between 100 to 200 degrees in centigrade. The synthesized carbon fine particles showed much higher capacity of hydrogen storage than commercialized SWNTs, CoMoCAT. It is suggested that the higher capacity of hydrogen storage for the synthesized carbon fine particles results from their larger surface area by curved and defected structure, which was confirmed by transmission electron microscopy.

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