Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

In-situ dynamical study of capillary absorption of molten silver nanodroplets by multiwall carbon nanotubes YEN-SONG CHEN, YUAN-CHIH CHANG, TUNG HSU, CHIA-SENG CHANG, DEPT. OF PHYSICS, NATIONAL TAIWAN UNIVERSITY TEAM, INSTITUTE OF PHYSICS, ACADEMIA SINICA TEAM, DEPT. OF MATERIALS SCIENCE AND ENGINEERING, NATIONAL TSING-HUA UNIVERSITY COLLABORATION — Since the discovery of carbon nanotubes (CNTs), they have been widely investigated for their properties. Due to the large aspect ratio and the uniform diameters, the inner cavities of the CNTs are used as nano test tubes, siphons, catalyst carriers, and so on. Based on recent molecular dynamic simulations, a CNT with open end might act as a "capillary pipette" which can absorb nonwetting metal nanoparticles. In our study, the in-situ dynamical process of nonwetting Ag nanodroplets drawn into the hollow cores of multiwall carbon nanotubes (MWCNTs) was observed in an ultrahigh-vacuum transmission electron microscope equipped with a scanning tunneling microscopy probe. We discover this capillary absorption of melted Ag nanodroplets can occur only when the ratio of the Ag nanodroplet size to inner diameter of MWNTs is below a critical value, which is dependent on the inner diameter of MWCNTs. With continuous operations of capillary absorption for Ag nanodroplets, the one-dimensional Ag nanowires with a specific length could be fabricated inside the MWNTs for NEMS electronics or other applications.

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Date submitted: 30 Nov 2010 Electronic form version 1.4