Supporting information

Revealing the Synergetic Effects in Ni Nanoparticle-Carbon Nanotube Hybrids by Scanning Transmission X-ray Microscopy and Their Application in the Hydrolysis of Ammonia Borane

Guanqi Zhao\textsuperscript{a}, Jun Zhong\textsuperscript{a*}, Jian Wang\textsuperscript{b}, Tsun-Kong Sham\textsuperscript{c}, Xuhui Sun\textsuperscript{a*}, and Shuit-Tong Lee\textsuperscript{a}

*Authors to whom correspondence should be addressed.

E-mail address: jzhong@suda.edu.cn (J. Zhong); xhsun@suda.edu.cn (X. Sun)
Figure S1: Magnified TEM images of (a) thick and (b) thin CNTs.
Figure S2: C 1s XPS results of pure CNT (thin) and pure CNT (thin) after H$_2$-treatment.

The inset shows the O 1s XPS data of pure CNT (thin).
Figure S3: High resolution TEM images of (a) Ni-CNT (thick) and (b) Ni-CNT (thin).

The bottom panels show the particle size distributions. The average particle size in Ni-CNT (thick) is 3 nm while it is 4 nm in Ni-CNT (thin).
Figure S4: (a) STXM map of a thick tube; (b) and (c): C K-edge XANES spectra of a thick tube measured at different positions (1-8).
Figure S5: Ni 2p XPS results of Ni-CNT (thin) and Ni-CNT (thick).
Figure S6: High resolution TEM images of (a) NiO-CNT-H$_2$ (thick), (b) NiO-CNT-H$_2$ (thin), (c) NiO-CNT-Ar (thick), and (d) NiO-CNT-Ar (thin). The bottom panels show the particle size distributions. The average particle sizes in NiO-CNT-H$_2$ (thick), NiO-
CNT-H₂ (thin), NiO-CNT-Ar (thick), and NiO-CNT-Ar (thin) are 6 nm, 6 nm, 12 nm, and 6 nm, respectively.
Figure S7: Stability test of NiO-CNT-H$_2$ (thin) in 2 runs for the hydrolysis of AB. The TOF value decreases from 19.07 to 7.2 (about 40% left).