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Selection of Single-Walled Carbon Nanotubes According to both Their Diameter and Chirality via Nanotweezers JING ZHOU, HONG LI, JING LU, GUANGFU LUO, LIN LAI, RUI QIN, LU WANG, ZHENGXIANG GAO, DAPENG YU, State Key Laboratory of Mesoscopic Physics and Department of Physics,Peking University, Beijing 100871, P. R. China, SHIGERU NAGASE, Department of Theoretical Molecular Science, Institute for Molecular Science, Okazaki 444-8585, Japan, WAI-NING MEI, Department of Physics, University of Nebraska at Omaha, Omaha, Nebraska 68182-0266, USA, GUANGPING LI, SICAS Center, Lee Hall, SUNY Oneonta, Oneonta, NY 13820, USA, STEFANO SANVITO, School of Physics and CRANN, Trinity College, Dublin 2, Ireland — Diameter- and chirality-dependent interaction between the aromatic molecule-based nanotweezers (NTs) and single-walled carbon nanotubes (SWNTs) is revealed for the first time by using the density functional theory. We found the threshold diameter of selected SWNTs is determined by the end-to-end distance of the NTs. Large-diametered SWNTs are preferred by the NTs with an obtuse folding angle, whereas small-diametered SWNTs are favored by the one with an acute folding angle. The adsorption can be further stabilized by the orientational alignment of the hexagonal ring between the NTs and SWNT sidewall. Therefore, by taking advantage of the supramolecular recognition ability of the NTs, SWNTs can be enriched with both controllable diameter and chirality.

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