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Reversible Charge Induced Separation Between Singlewalled Carbon Nanotubes SANGEETA SAHOO, RAVI MARANGANTI, SARAH LASTELLA, GOVIND MALLICK, SHASHI KARNA, PRADEEP SHARMA, PULICKEL M. AJAYAN, Department of Materials Science and Engineering, Rensselaer Polytechnic Institute, Troy, New York 12180-3590 — We report the observation of local separation between single-walled carbon nanotubes in a bundle using low-energy electron-beam (e-beam) irradiation in scanning electron microscope. The effect of the separation is shown to impact the electrical characteristics of small nanotube bundle devices. By semi-analytical calculation we show that the Coulomb repulsive force due to the electrostatic charging can be stronger than the attractive van der Waals force in order to initiate the separation between the nanotubes in a bundle. In addition, the separated nanotubes are observed to return back to their original packed state on removal of electron exposure. We discuss this reversibility of the separation process in the light of thermal fluctuation and discharging of nanotubes at room temperature in the presence of air.

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