Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Rings of Functionalized Carbon Nanotubes: Characterization and Properties of a Novel Magnetic Material[1] BENJAMIN WUNSCH, Massachusetts Institute of Technology, LISA VACCARI, MAURIZIO PRATO, Universitá di Trieste, FRANCESCO STELLACCI, Massachusetts Institute of Technology, UNIVERSITÁ DI TRIESTE COLLABORATION, MASSACHUSETTS INSTITUTE OF TECHNOLOGY COLLABORATION — Carbon nanotubes are a promising material for electronic, optical and biological applications. However, applications that require large nanotube quantities are hindered by difficulties in processability, due to the perennial presence of amorphous carbon impurities, and to the tubes' insolubility. Side wall covalent functionalization is a possible solution to generate soluble nanotubes but large scale purification remains a challenge. Here we show that single walled carbon nanotubes, appropriately functionalized, spontaneously assemble into rings of varying size. A thorough scanning probe microscopy analysis shows that each ring is formed by bundles of nanotubes and is composed by the assembly of shorter building blocks. Models explaining the ring formation will be presented. Also, magnetic measurements show that eddy currents flow through the rings when an alternating magnetic field is applied. Thus these rings exhibit a strong magnetic response both in solution and when assembled onto a substrate. We show that this property can be used to separate nanotubes from non-magnetic impurities; opening up new possibilities for large scale carbon nanotube purification.

[1]Authors 1 and 2 contributed equally to the work

Benjamin Wunsch
Massachusetts Institute of Technology

Date submitted: 30 Nov 2004 Electronic form version 1.4