

Abstract Submitted
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Superconducting Mechanism in multi-walled Carbon Nanotubes

YONG-JIHN KIM, University of Puerto Rico — Recently Japanese group led by Haruyama [1] reported the significant enhancement of superconductivity, i.e., $T_c=12K$, in end-bonded Multi-walled Carbon Nanotubes. We can explain the enhancement by the electron confinement in the lateral direction, i.e., between the inner and outer cylinders, because electron density correlation enhances the phonon-mediated superconductivity. In other words, superconductivity in the (multi-walled) Carbon Nanotubes is due to the electron-phonon interaction and T_c is enhanced due to the density correlation caused by the confinement. First, we use simple concentric rings to estimate the T_c enhancement using the BCS theory. Next, we use the tight-binding model to calculate the T_c increase more accurately. In this context, this experimental result is very similar to the enhancement of $T_c=15K$ in 4 angstrom single-walled Carbon Nanotubes by Tang et al. [2]. [1] I. Takesue et al., Phys. Rev. Lett., Vol. 96, 057001 (2006). [2] Z. K. Tang et al., Science, Vol. 292, 2462 (2001).

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