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Superconductivity in entirely end-bonded multi-walled carbon nanotubes JUNJI HARUYAMA, IZUMI TAKESUE, NAOKI KOBAYASHI, Aoyama Gakuin University, SHOHEI CHIASHI, SHIGEO MARUYAMA, Tokyo University, TOSHIKI SUGAI, HISANORI SHINOHARA, Nagoya University — One-dimensional (1D) systems face some obstructions that may prevent the emergence of superconductivity(SC), e.g., 1.a Tomonaga-Luttinger liquid (TLL), 2.Peierls transition, and 3.Low density of states due to VHSs. A carbon nanotube (CN) is one of the best candidates for investigating a possibility of 1D SC and its interplay with such obstructions. Only two groups have experimentally reported SC in ropes of single-walled CNs (SWNTs) and very thin SWNTs [1] to date. In addition, those interplay with 1D phenomena have never been clarified. Some theoretical papers also predicted strong correlation between TLL states and SC for SWNT ropes and importance of electron-phonon interaction for thin SWNTs [2]. Here, we report that entirely end-bonded multi-walled CNs (MWNTs) can show SC with the T_c as high as 12K [3] (about 50-times larger than T_c in former of [1]). We find that emergence of this SC and its interplay with TLL states are highly sensitive to junction structures of Au electrode/MWNTs. Only MWNTs with optimal numbers of electrically activated shells realized by the entire end-bonding can allow the SC due to intershell effects. **Refs.** **1.**M. Kociak, et al., PRL 86, 2416 (2001); Z. K. Tang, et al., Science 292, 2462 (2001), **2**.J.Gonzalez, PRL 88, 076403 (2002); R.Barnett, et al., PRB 71, 035429 (2005), **3**.J.Haruyama et al., PRL Accepted

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