

Abstract Submitted
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A model of dry-drawing of multiwall carbon nanotube forest into self-assembled sheets and yarns ALEXANDER KUZNETSOV, ALEXANDRE FONSECA, RAY BAUGHMAN, ANVAR ZAKHIDOV, NanoTech Institute, University of Texas at Dallas — A dry-state technique to produce highly-oriented, free-standing multiwalled carbon nanotube (MWNT) sheets and yarns which are mechanically strong, transparent, and highly oriented has been developed recently [1,2]. A model which allows to describe the main features of the process of dry-drawing self-assembly of vertically oriented multiwall carbon nanotube (MWCNT) forest into horizontal MWCNT sheets or yarns is developed in this presentation. The model is based on two main concepts: 1. self-strengthening of nanotube bundle interconnects during the bending-pulling process; 2. rearrangement of bundles by accordion-type stretching motion accompanied by detachment of bundles (at the top and bottom of the forest). This detachment occurs due to unzipping and self-strengthening of interconnects beyond a critical force, which permits to pull the next bundle from the forest, keeping the process of dry-drawing continuous. Developed model determines the parameters of CNT forest for which the dry-drawing is possible. It also allows to estimate such properties of the produced sheets and yarns as length, density, strength and electrical conductivity. [1] M. Zhang et al., Science **2005**, 309, 1215. [2] M. Zhang et al., Science **2004**, 306, 1358.

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