

Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Transport Anomalies and Possible High T_c Superconductivity in interconnected multiwall carbon nanotube sheets doped by ion implantation¹ ANVAR ZAKHIDOV, AUSTIN HOWARD, NICHOLAS CORNELL, ULAS GOSKUN, MYRON SALAMON, RAY BAUGHMAN, JULIA BYKOVA, NATHANAEL MAYO, University of Texas at Dallas, XUEMEI WANG, EDUARD GALSTYAN, HERBERT FREYHARDT, WEI KAN CHU, University of Houston, UTD-UH TEAM COLLABORATION, UTD TEAM — Ion implantation offers an alternative doping method. In searching for superconductivity, we describe here the ion-implantation doping of MWCNT interconnected networks by boron and other dopants (phosphorous, sulfur, arsenic) and report transport anomalies in oriented networks of ion implanted MWCNT sheets as compared to cross coated (non-oriented multilayer MWCNT sheets). The strong drop of resistance R(T) with temperature decrease starting at T_{c1}= 50-60 K and even at higher T is reminiscent of inhomogeneous superconducting islands appearing in the non-SC matrix. An unusual anomaly of the 4-terminal resistance is observed in many samples, R(T) becoming negative at lower T < T_{c2} ~ 10-20 K, This negative resistance is found to be associated with unusual I-V curves with s-shape at low T < T_{c2} and R(T) shows nonlinear dependence on excitation current and other features that are studied carefully in MWCNTs with different lengths and densities. This negative-resistance behavior gives a hint for the possible incorporation of superconducting areas and can be explained in terms of an imbalanced resistance bridge.

¹AFOSR grant FA 9550-09-10384

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Date submitted: 23 Nov 2011

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