Electrically conductive and transparent Carbon Nanotubes based thin films

Juergen Jopp[1], Shani Eliyahu[2] and Rachel Yerushalmi-Rozen[1,2]

1) Ilse Katz Institute for Nanoscale Science and Technology, Beersheva, Israel
2) Department of Chemical Engineering, Beersheva, Israel

Percolated networks of electrically conducting nano-scale wires are currently attracting attention as building block for nanometrically thin transparent and electrically conductive layers. These are expected to offer an alternative to traditionally used Indium Tin Oxide (ITO) in applications ranging from LCD displays to electrodes in organic solar cells.

Leading candidates are percolated networks of Carbon Nanotubes, or polymeric composites containing Carbon Nanotubes additives. In this study we describe the characterization of random networks of pristine, non-treated multi-walled carbon nanotubes (MWNT) and Single walled carbon nanotubes (SWNT) deposited on an isolating substrate.

Reliable measurements of the electrical properties of such systems require the optimization of the electrode configuration and contact materials. Thickness and transparency measurements complement the relevant information.

It is demonstrated that the method used for dispersion of the MWNT and preparation of the networks affects the conductivity of the resulting films.

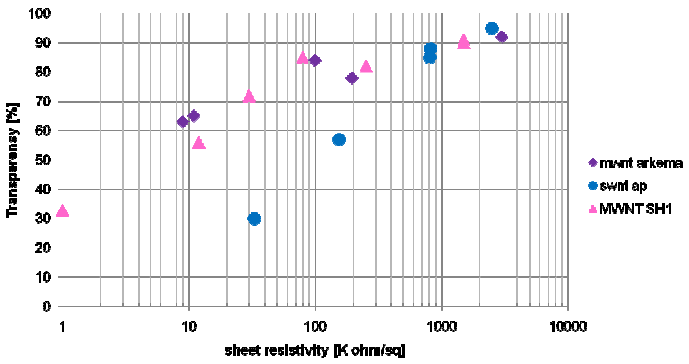

Figure 1: Transparency (at the visible) and sheet resistivity as a function of film thickness in networks of SWNT and MWNT deposited on PPC (polypropylene carbonate)

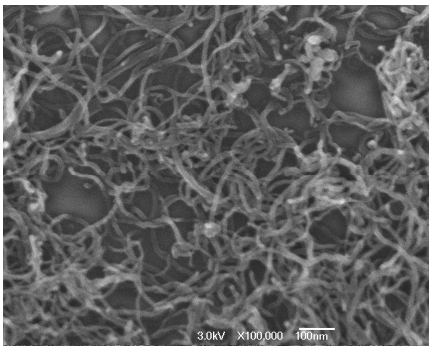

Figure 2: A SEM image of a MWNT network on a PPC substrate prepared from NMP dispersions of MWNT.