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Highly Transparent and Conductive Carbon Nanotube Thin Film Assemblies DANIEL GAMBOA, YONG TAE PARK, AARON HAM, JAIME GRUNLAN — Layer-by-layer (LbL) assembly was used to generate transparent, highly conductive thin films containing carbon nanotubes. Purified single-walled carbon nanotubes (SWNT), stabilized with negatively-charged deoxycholate, were alternately deposited with poly(diallyldimethylammonium chloride) [PDDA] from water onto a PET substrate. These assemblies exhibit visible light transmission $>$ 70% (measured at 700 nm) and electrical conductivity of $\sim$ 100 S/cm ($\sim$ 50 nm thick with a sheet resistance of $\sim$ 2 kΩ/sq) after 20-bilayers of deposition. After heating for just two minutes at 350^{o}C (on a glass substrate), transparency is increased and conductivity approaches 400 S/cm. With just two bilayers of SWNT/PDDA, these films have an electrical conductivity of 30 S/cm (12 nm thick with a sheet resistance of 70 kΩ/sq) and transmission greater than 95% at 700nm. This study demonstrates the ability of the LbL technique to produce highly transparent and conductive nanotube-based thin films. These types of films are potentially useful for anti-static films with few bilayers or transparent electrodes with tens of bilayers. Flexible displays, smart windows and solar cells could all benefit from this technology platform.

Jaime Grunlan
Texas A&M University

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