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Dynamical Effects of Doping in Single Wall Carbon Nanotube Solutions and Films NEALE O. HAUGEN, ADAM B. PHILLIPS, TIENEKE E. DYKSTRA, MICHAEL J. HEBEN, RANDY J. ELLINGSON, The University of Toledo — We report a transient absorption (TA) study of doping in single-walled carbon nanotube (SWNT) films and solutions. An aqueous solution of pulsed laser vaporization SWNTs were spray-deposited to form films; the films were soaked in a solution of nitric acid, which collapsed them through removal of the surfactant. The nitric acid treatment induces p-type doping by protonation, and suppresses the lowest energy semiconducting (E1) optical absorption. Photo-exciting at 1215 nm and probing at the E1 peak yielded a strong photoinduced absorption (PA). De-doping the film by heating to 250°C for 30 minutes recovered the E1 linear absorption feature and converted the transient PA to a photoinduced bleach (PB). Films heated in air re-dope within a day in laboratory air, while films heated in nitrogen resisted re-doping under ambient laboratory air. Solution measurements involving oxygenated and deoxygenated solutions and different surfactants indicate the doping depends strongly on adsorbed molecular oxygen.

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