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Far-infrared through visible optical characterization of polymer-based electrochromic devices on single-walled carbon nanotube electrodes[1] ZAHRA NASROLLAHI, SVETLANA V. VASILYEVA, EVAN P. DONOGHUE, ANDREW G. RINZLER, D.B. TANNER, Department of Physics, University of Florida, Gainesville, Florida 32611 — Electrochromic polymers (ECPs) exhibit reversible optical modulation in a wide spectral range as a function of an externally applied voltage. In this work, ECPs have been used in absorptive/transmissive electrochromic devices as candidates for smart window applications. The electrochromic devices were fabricated on flexible polyethylene substrates and used ECPs sandwiched between thin films of single-walled carbon nanotubes serving as conductive and flexible electrodes. Unlike ITO, the nanotube films are highly transmissive in the visible and infrared region of the spectrum. The transmission and reflection of the individual device components as well as assembled devices were measured over a wide spectral range (FIR to UV). The devices were switched in situ in the spectrometers. The optical constants of the constituent layers were calculated using the Drude-Lorentz model. The devices demonstrated high transmission contrasts between their colored and bleached states in the VIS, NIR, and MIR spectra, enabling electrically tunable control over the transmission or reflection of both light and heat. This control could lead to reduced heating or cooling costs in real world applications and the flexible nature of the device components allows many applications.

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