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Solid-state electrochromic device for 8-12 μm based on Poly(3,4-ethylenedioxythiophene)[1] ILSUP JIN, BRUCE DUNN, Dept. of Materials Science and Engineering, University of California, Los Angeles — Poly(3,4-ethylenedioxythiophene) (or PEDOT) was used as the electrochromic element for solid-state devices operating in the 8-12 μm range. The reflection-mode devices used anti-reflection coated germanium windows as the substrate in order to minimize surface reflection and increase the contrast ratio of the device. Upon doping the polymer using a gel electrolyte, there was a substantial change in the refractive index of PEDOT which induced a large index mismatch with the substrate and produced high reflection from the substrate/PEDOT interface. The reflection modulation between the doped and undoped states was approximated using Fresnel's equation and estimates of the refractive index mismatch. The calculated values were in reasonable agreement with the experimental results. When PEDOT was fully doped, the device exhibited its maximum reflection of 50-60% in the 8- 12 μm regime, while in the undoped state, the device had 10-20% reflection. The maximum contrast ratio observed for the device, $\sim$ 5.5, occurred at 8.25 μm. The use of rapid scans of the FT-IR enabled us to monitor, in real time, the infrared switching dynamics. Switching times on the order of 1 to 2 seconds were observed.

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