

Measurement of Optical Properties of Polydimethylsiloxane from 2 Microns to 15 Microns

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Polydimethylsiloxane (PDMS) is an organosilicon compound used widely to embed electronic components, fabricate microfluidic and other MEMS/NEMS devices, and also in shampoos and lubricating oils. Most of the literature has focused on the electronic, thermal, rheological, and mechanical properties of PDMS. Though some works are reported on the optical properties, not much is known about the optical properties in the 2 microns - 15 microns range. We measured the wavelength dependent reflectivity from bulk PDMS substrates (5 mm thick) as well as thin films using an FTIR microscope. By using constrained nonlinear minimization of a least squares function to fit the bulk reflectance spectrum of PDMS with a classical oscillator function, the complex refractive index of PDMS is extracted. The emissivity spectra of PDMS thin films of various thicknesses are then predicted using said extracted properties and compared to experimental emissivity spectra from FTIR microscope measurements.