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Optical constants of 3,4,9,10-perylenetetracarboxylic dianhydride films on silicon and gallium arsenide studied by spectroscopic ellipsometry

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Abstract:

The optical constants of 3,4,9,10-perylenetetracarboxylic dianhydride (PTCDA) films grown by organic molecular beam deposition on Si and GaAs substrates were determined in the spectral range from 300 nm to 1700 nm. All PTCDA layers deposited at room temperature with a low deposition rate of about 0.2 nm/min are uniaxial and strongly optically anisotropic. For the layers on Si a refractive index of 2.21 is derived in the substrate plane at 830 nm. The out-of-plane refractive index has a much lower value of 1.58. A similar anisotropy is observed for PTCDA layers on GaAs. The altogether lower refractive indices of 2.03 and 1.54, however, indicate a lower density of the films, which can be explained by the film structure.

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