

Characterization of optical properties of optical polymers

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Abstract Possible applications of polymer materials in optical systems and devices are defined mainly by their optical properties in terms of refractive indices, transmission, dispersion and thermo-optic coefficients. We have examined more than twenty types of optical plastics including basic, commercial and some new development materials. Detailed measured refractometric data and transmission spectra in the visible and near infrared regions are presented. Variation of refractive indices with temperature is considered to obtain the thermo-optic coefficients. Discussion on dispersion of studied optical polymers and comparison to glass is included on the base of a number of dispersive characteristics and curves.

Keywords Optical polymers · Refractive index · Dispersion · Thermo-optic coefficients

1 Introduction

Recently, attention is drawn to hybrid glass-polymer optics which combines the advantages of glass and polymer materials and meets the requirements of high quality imaging in various environment conditions (Doushkina 2010). Comparative optical characterization of polymers to glass is needed to confirm their compatibility.

Optical polymers (OPs) are widely used in a variety of industries for their low cost and weight, high impact resistance and ability to integrate proper mechanical and optical features (Menendez et al. 1999; Tolley 2003). Great economies are possible through usage of polymers for reproducing aspheric and other complex geometric surfaces, integrated components with non-circular apertures or elements with very small dimensions, which are costly to produce

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