Waveguide optical properties of polystyrene doped with \( p \)-nitroaniline derivatives


Abstract

New copolymers of styrene with \( N \)-acryloyl \( p \)-nitroaniline or \( N \)-diethyl methylenemalonate \( p \)-nitroaniline chromophores were synthesized and characterized by size exclusion chromatography (SEC), thermal analyses (DSC, TGA) and reflectometry. The linear optical properties of the polystyrene copolymers and the polystyrene (PS) doped with \( p \)-nitroaniline derivative chromophores were investigated and were related to the chromophore content in the matrix by prism coupling at 633 nm. Thin films of the polymers with good optical quality were prepared by the spin coating method. The glass transition and decomposition temperatures and the refractive index profile of the copolymers were similar to those of the parent PS. On the other hand, the PS doped with \( p \)-nitroaniline derivative chromophores had lower glass transition temperatures attributed to the plasticizing effect of the chromophore and different refractive index profiles compared with the parent PS.
Keywords

- Polystyrene;
- p-Nitroaniline derivative;
- Spin coating;
- Refractive index;
- Waveguide