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## **Preparation and Characteristics of Polymethylmethacrylate and Polycarbonate – Nanocomposites for Optical Applications**

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In many areas, including the optics industry, glass is being increasingly replaced by plastic materials. Usually polymethylmethacrylate and polycarbonate are widely used for the production of optical components. Plastics exhibit good optical properties and have many advantages like low weight, cost-effective and easy production of complex shapes compared to the glass components. The disadvantage of plastic components so far is an inability to vary the Abbe' number, which in glass components can easily be realized by changing the composition. Furthermore the properties of plastics change with temperature. However, modifications of transparent polymers with inorganic nanoparticles can improve hardness, abrasion resistance and heat resistance. The application of nanoparticles in transparent polymers can also increase the refractive index, which then allows to extend the application area of optical components of plastic materials.

Polymethylmethacrylate and polycarbonate nanocomposites with different nanomaterials were compounded by melt extrusion in a twin screw extruder. The test specimens were produced by injection moulding. The distribution of nanoparticles in the polymer matrix was optimized by means of the surface modification of the nanoparticles and by optimizing process parameters like temperature and screw configuration. The influences of the particle type and content of a nanomaterial on the mechanical properties like tensile and flexural strength, abrasion and hardness were investigated. The rheological properties of nanocomposites were investigated with dynamic rheological experiments. The correlation between the morphology and optical properties of nanocomposites was investigated. Furthermore, the influence of the content of nanoparticles on the rheological properties of the materials was characterized.