

## Polymerization, Structure and Thermal Properties of ODPA-DMB Polyimide Films

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A new high molecular weight polyimide based on 4,4-oxidiphthalic anhydride (ODPA) dianhydride and 2,2'-dimethyl-4,4'-diaminobiphenyl (DMB) diamine has been synthesized *via* a one-step polymerization method. This polyimide is soluble in phenolic solvents. Thin films with thickness of 7 and 30  $\mu\text{m}$  were cast from the polymer solution and show in-plane orientation of ordered regions detected *via* wide angle X-ray diffraction and on a molecular scale by Fourier transform infrared spectroscopy experiments. This anisotropic structure leads to anisotropic optical properties arising from two different refractive indices along the in-plane and out-of-plane directions. ODPA-DMB possesses high thermal and thermo-oxidative stability. The glass transition temperature has been determined to be 298°C. Dynamic mechanical analyses show two relaxation processes appearing above room temperature: the  $\beta$  and the  $\alpha$ -relaxation process. The  $\alpha$ -relaxation corresponds to the glass transition while the  $\beta$ -relaxation is a sub-glass transition process associated with the non-cooperative subsegmental motion.