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Synthesis and Characterization of Novel Polyimides Containing Fluorine and Phosphine Oxide Moieties

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Novel diamine monomers, containing fluorine and phosphine oxide, bis(3-aminophenyl) 3,5-bis(trifluoromethyl)phenyl phosphine oxide (mDA6FPPO), bis(3-aminophenyl)-4-(trifluoromethyl)phenyl phosphine oxide (mDA3FPPO), bis(3-aminophenyl)-2,3,5,6-tetrafluoro-4-trifluoromethyl phenylphosphineoxide (mDA7FPPO) were prepared and characterized by FT-IR, ^{1}H-NMR, ^{31}P-NMR, ^{19}F-NMR, titrator and elemental analyzer (EA). A phosphine oxide containing monomer, bis(3-aminophenyl) phenyl phosphine oxide (mDAPPO) was also used for comparison. The monomers were then utilized to prepare polyimides with dianhydrides such as 6FDA, BTDA, ODPA or PMDA by the conventional two-step method; preparation of poly(amic acid), followed by solution imidization. The polyimides were characterized by FT-IR, NMR, DSC and DMA, with intrinsic viscosity, refractive index and adhesive properties also being evaluated. The polyimides with mDA6FPPO exhibited high Tg, good thermal stability, low dielectric constant, and low birefringence.