Preparation and Characterization of Copolyimide/Silica Nanocomposite with Low-level CTE

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A series of copolyimide/silica nanocomposites have been prepared by polymerization of 4,4'-oxydianiline (ODA), 1,4-phenylene diamine (PDA), 1,2,4,5-benzentetracarboxylic dianhydride (PMDA) and a silica network using the new reaction method. The new reaction method is analogous to a gol-gel process, but one point is different. That is, TEOS, ethanol and catalyst are added into the diamine solution before dianhydride is added. A series of copolyimide/silica nanocomposites were different with silica contents and compared with pure copolyimide synthesized from ODA, PDA and PMDA. Also they are synthesized random and block copolymers. The resulting materials were measured for coefficient of thermal expansion (CTE), dielectric constant, thermal stability, and morphology.