

Preparation of polypyromellitimide-poly(arylsilsesquioxane) hybrid materials *via* charge transfer interaction by sol-gel process and their properties.

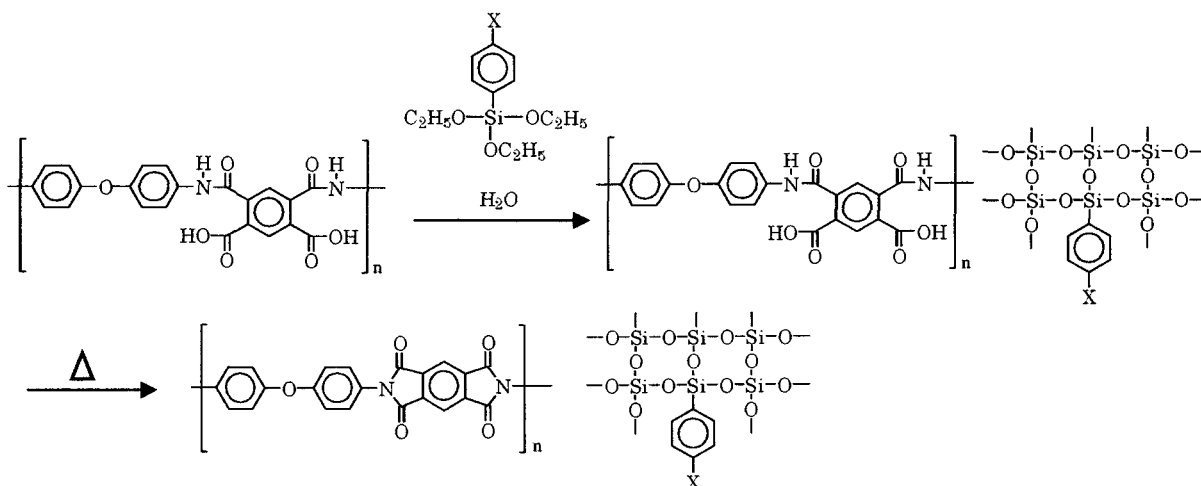
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Homogeneous polyimide-poly(arylsilsesquioxane) hybrid films have been prepared using the sol-gel method starting from aryltriethoxysilanes. Three kinds of aryltriethoxysilane, phenyltriethoxysilane(X=H), *p*-tolyltriethoxysilane(X=Me), and *p*-methoxyphenyltriethoxysilane(X=MeO), were hydrolyzed and polycondensed in the solution of polyamic acid derived from *bis*(4-aminophenyl)ether and pyromellitic dianhydride in *N*-methyl-2-pyrrolidone. Three kinds of hybrid films, PI-Ph-Si, PI-MePh-Si, and PI-MeOPh-Si, were obtained by casting the solution mixture, followed by heating up to 300°C.

The values of glass transition temperature for the hybrid films measured by dynamic mechanical analysis increased in the order of PI-MeOPh-Si > PI-MePh-Si > PI-Ph-Si. The mobility of the polyimide chains was dependent on the inductive effect of substituents in the aromatic groups of poly(arylsilsesquioxane), and suggested the presence of charge transfer interactions between electron-accepting pyromellitimide fragment in polyimide backbone and electron-donating aromatic groups of poly(arylsilsesquioxane)



PI-Ph-Si(X = H), PI-MePh-Si(X = Me), PI-MeOPh-Si(X=MeO)

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