

The ionic liquid effect on the preparation of epoxy-silica nanocomposites

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The imidazolium based ionic liquids (ILs) have been proved to be very efficient in structure control and reinforcement of nanocomposites. The epoxy-silica nanocomposites were prepared by simultaneous epoxy network build-up and in situ formation of silica nanodomains by the sol-gel process. The presence of a small amount (0.6 wt.-%) of IL controls the hybrid formation and the interfacial interaction. Both the anionic and cationic IL components are of importance.

The application of 1-n-decyl-3-methylimidazolium tetrafluoroborate IL together with HCl as an acid catalyst promotes reactions of the sol-gel process and self-assembly ordering of the IL. It produces very fine hybrid morphology with well-dispersed silica nanodomains and a significantly increased rubbery modulus due to physical crosslinking by the ordered domains of decyl substituents. The IL 1-triethylene glycol monomethyl ether-3-methyl imidazolium methanesulfonate catalyzes the silica formation, affects the interfacial epoxy-silica interaction and leads to a remarkable enhancement of tensile properties; including tensile modulus, strength and toughness. Surface properties of the nanocomposites, such as hydrophobicity, were also well controlled.

Biography

Henri Stephan Schrekker initiated his independent research career in May 2006 as Assistant Professor of the Department of Organic Chemistry at Universidade Federal do Rio Grande do Sul. Since then he acted as group leader of the Laboratory of Technological Processes and Catalysis. His research interests are focused in the fields of catalysis, nanoscience and polymers. In the year 2007, he received the DuPont Young Faculty Award, being the first recipient that performs research in South America. Actually, he is member of the Brazilian Advanced Center for Olefin Catalysts and has published more than 20 papers in reputed journals.

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