Polymerized ionic liquid-grafted silica hybrid materials

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ABSTRCT

Room temperature ionic liquids (RTILs) are organic molten salts composed of organic cations and inorganic or organic anions that having melting points below 100 °C. RTILs have become a very popular solvent used in various chemical research fields because of their unique chemical and physical properties. Recently, we prepared several different kinds of polymerized ionic liquid (PIL)-grafted silica hybrid materials based on the preparation of ionic liquid monomers and their grafting on 3-mercaptopropyl-silica via a surface-initiated radical-chain transfer reaction. These materials were used as new stationary phases for high-performance liquid chromatography (HPLC).

One kind of PIL-modified silica materials were prepared by the grafting of 1-vinyl-3-alkylimidazolium cations which leading only alkylimidazoilum was immobilized on the supports. And the counteranions could be changed easily by ionic self-assembly or anion-exchange process. The counteranions were exchanged from bromide to methyl orange (MO) and the significantly enhanced shape selectivity towards geometric isomers of polycyclic aromatic hydrocarbons (PAHs) was investigated and found to result from the anionic effect.

Other kind of polymerized IL-modified silica materials were prepared by the copolymerization of polymerizable alkylimidazolium and counter anionic monomer pairs on silica. These new stationary phases presented favourable performance when used to separate PAHs, bases and nucleosides, and etc. in reversed-phase and/or hydrophilic interaction chromatography. Compared with previously reported IL-modified silica materials, the present anionic and cationic copolymerized materials has a distinct advantage that the stability can be increased because the anions and cations of ILs are both immobilized on the silica.