Local and Nanoscopic Structure of Potassium-Doped Siloxane-Polieters Ormolytes

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Abstract

Siloxane-poly(oxyethylene) (PEO) hybrids obtained by the sol-gel process and containing short polymer chain have been doped with potassium triflate salt (KCF3SO3). The local structure of these hybrids was investigated by X-ray absorption spectroscopy (XANES and EXAFS) at the potassium K-edge. Small angle X-ray scattering (SAXS) was used to determine the structure at nanometer scale. Results reveal that at low and medium potassium concentration (n=[O]/[K]8, the oxygen being of the ether-type of the PEO) the cations interact mainly with the polymer chains, while at larger doping level (n ¡ 8) the formation of a PEO:KCF3SO3 complex is observed,resulting on a decrease of ionic conductivity. The nanoscopic structure of the hybrids is also affected by doping. By increasing the doping level a diminution of the electronic density contrast between siloxane nanoparticles and PEO matrix and a diminution of the siloxane interparticle distance are observed. At high doping level the SAXS patterns are strongly modified, showing the disappearance of the interference peak and the formation of a potassium-containing nanophase.