

Nanocomposites and nanomaterials

Cationic ionic liquids based on a mixture of oligomeric silsesquioxanes containing tert-amine and hydroxylic groups

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Within the last years polyhedral oligosilsesquioxanes (POSS) have become very popular as nanometer-scale building blocks in a wide range of polymeric materials promising for modern applications spreading from biomedical to airspace technologies. The aim of this work is to develop methods for the synthesis of cationic oligomeric ionic liquids (OILs) based on a mixture of oligomeric silsesquioxanes containing tert-amine and hydroxylic groups (POSS-M).

POSS-M, prepared according to [1], was quaternized with bromopropane (POSS-C₃⁺Br⁻) and bromodecane (POSS-C₁₀⁺Br⁻) at the ratios of N : R-Hal equal to 1:1. The obtained OILs are viscous liquids, soluble in polar solvents. The structure of the compounds was studied by IR- and ¹H NMR (DMSO-d₆) spectroscopy. In accordance to DSC, the OILs are characterized with a single glass transition and T_g of POSS-C₃⁺Br⁻ (-24 °C) is lower than T_g of POSS-C₁₀⁺Br⁻ (-4 °C). The ionic conductivity (defined by dielectric relaxation spectroscopy under nitrogen atmosphere) of POSS-C₃⁺Br⁻ is higher than that of POSS-C₁₀⁺Br⁻ and equal respectively to 3·10⁻⁵ and 2,2·10⁻⁸ S/cm at 40 °C and 1,4·10⁻³ and 1,3·10⁻⁴ S/cm at 120 °C. The obtained OILs are thermally stable up to 180 °C. It was found with use of standardized single-disc method that POSS-C₁₀⁺Br⁻ has dose-dependent fungistatic effect on culture of *Candida* spp. At the concentration of solution of POSS-C₁₀⁺Br⁻ equal to 1.0 %, the diameter (mm) of zone of growth inhibition of clinical isolates *Candida glabrata*, *Candida krusei* and *Candida albicans* is 38, 24 and 10 mm respectively.

1. Mori H., [Lanzendörfer](#) M.G., [Müller](#) A.H.E., Klee J.E. Silsesquioxane-based nanoparticles formed via hydrolytic condensation of organotriethoxysilane containing hydroxy groups // *Macromolecules*. – 2004 – 37. – 14. – P. 5228-5238.