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Perspective of bridged polysilsesquioxanes for manufacturing different types of sol-gel materials

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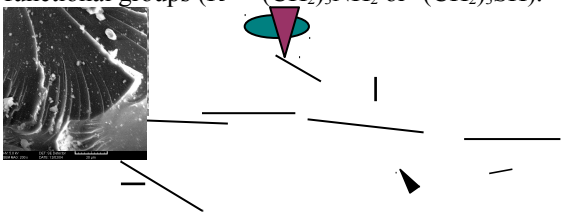
Sol-gel technology is among the most promising areas of modern nanotechnology. It allows obtaining nonporous and porous materials with a wide range of controlled pore sizes, such as xerogels, nanoscale thin films and coatings, membranes, nanoparticles, composites, etc. [1, 2]. Application of bridged polysilsesquioxanes as structuring agents opens new possibilities for regulating the properties of final products. In this paper we have presented production of different types of materials (xerogels, membranes, and nanoparticles) by varying the conditions of the hydrolytic polycondensation of sols of same composition: bridged polysilsesquioxane precursors ($(EtO)_3Si\text{-}C_2H_4\text{-}Si(OEt)_3$) and alkoxysilanes with functional groups (R = $-(CH_2)_3NH_2$ or $-(CH_2)_3SH$).



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Such precursors in hydrolytic polycondensation reaction can significantly realize the idea of constructing materials on molecular level, the essence of which is to maintain control over the characteristics of these materials. The introduction of alkoxysilanes endows materials with required specific properties. Thus, adherence to the above-mentioned requirements enables target synthesis of novel materials - hybrid organic-inorganic composites of various types.

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