

The silicon content in the outer zones of the earth equals ca. 30%. After oxygen, it is the most common element. Silica SiO_2 , silicates and aluminum silicates constitute the majority of the rocks forming the Earth's crust. However, silicon dioxide is insoluble and non-reactive compound, therefore it has not possess a direct application in chemistry. If one oxygen atom, in SiO_2 , is replaced by an organic group, silica becomes reactive compound.

Polyhedral oligomeric silsesquioxanes (POSS) constitute large and diverse group of chemical species. In their molecular structures, such molecules combine features of silicon-oxygen core with properties of organic functional groups attached to vertices of siloxane core. These compounds are obtained in the hydrolytic polycondensation reactions of appropriate silanes or during functionalization of silsesquioxanes possessing functional reactive groups. Properties of POSS derive from the presence of rigid and thermally stable silicon-oxygen core, organic groups and from the size of molecules what make them an interesting materials to various sophisticated studies. The ability to design a proper molecule creates the possibility of obtaining a new class of organic-inorganic hybrid materials with unique unprecedented properties.

