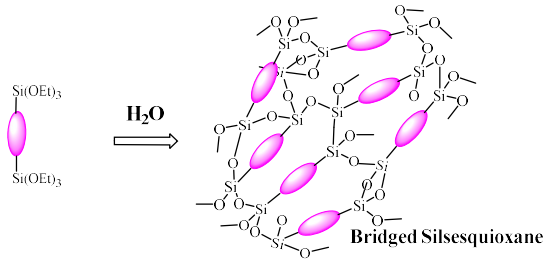
ABSTRACT:

Bridged silsesquioxanes (BS) are known since three decades[1,2] and are obtained by the hydrolysis-condensation of silylated precursors with bridging organics, $(EtO)_3Si\text{-}R\text{-}Si(OEt)_3$ (R = organic fragments). Thanks to the mild sol-gel reaction conditions, the relatively strong covalent Si-C bonds are maintained during the reaction resulting in the formation of unique hybrids which consist of a uniform distribution with stoichiometric Si/C ratio of covalently bonded organics interconnecting at least two silicon atoms (scheme below).



Synthesis of BS from polysilylated precursors

These hybrid organic-inorganic materials combine the inherent properties of the organic fragments with those of the silica network (mechanical and chemical strengths as well as high surface area and porosity). Accordingly to the variety of organic units that can be introduced in BS, one can tune the properties of the final materials for targeted applications (e.g. catalysis, optics, magnetic and imaging, etc.). Moreover these hybrids can be structured in mesoporous materials when synthesized with a surfactant. The resulting hybrid is called Periodic Mesoporous Organosilicas (PMO).

In this presentation, the design of selected BS precursors will be shown.[3] The role of the organics for the self-directed structuring[4] as well as template-mediated structuring of these hybrids[5,6] will also be addressed and finally some examples will be given for several fields of application. [7,8,9]

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