



Synthesis of New Functionalized Silsesquioxanes

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Silsesquioxanes (SQs) are inorganic-organic hybrid compounds consisting of an inorganic siloxane core and organic groups. Compared to widely used silicone, SQs possess more Si-O bonds and thus exhibit better thermal and mechanical properties. Cage-, partial cage- and ladder-type structures are three common well-defined frameworks of SQs.^[1] Cubic SQs (abbr. as T_8), the most studied cage-type SQs, found various applications in the field of coating materials, energy-related materials, catalysis, biomedicine and so on.^[2] In the last decade, two other types of SQs, double-decker SQs (DDSQs) and ladder-type SQs (LDSQs) have been increasingly studied. DDSQs, developed from partial cage-type SQs with two decks, show higher molecular flexibility than T_8 , and are widely used in the preparation of polymers to enhance thermal/mechanical properties.^[3] As LDSQs, they are of great interest in optical and electronic areas because of their high refractive index and highly ordered double chain structure.^[4] Recently, some new structures of SQs, for example, large cages like T_{18} with a $Si_{18}O_{27}$ core,^[5] “Lantern cage” with inserted additional siloxane chains,^[6] “Butterfly cage” derived from DDSQs with two longer siloxane side caps,^[7] and “Bat siloxane” based on tricyclic ladder-type structure but with larger side rings,^[8] have been reported as well. In this work, we developed efficient synthetic routes to different types of SQs bearing reactive groups. The obtained new SQs were characterized by several analytical methods and their potential in multiple application fields is underway.

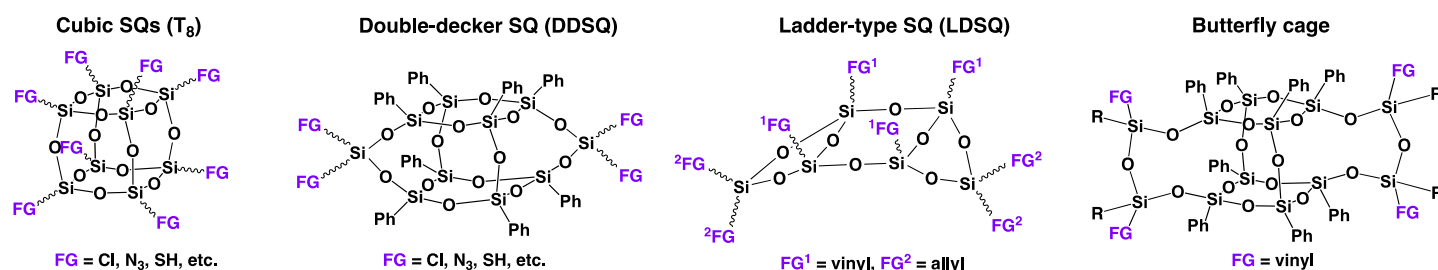


Figure 1: Different types of SQs with reactive groups.

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