

## Preparation of Fluoroalkyl End-Capped Oligomers/Silica Nanocomposites Possessing a Nonflammable Characteristic Even After Calcination at 800 oC

**Authors :** Hideo Sawada

**Abstract :** Fluoroalkyl end-capped oligomers [RF-(M)<sub>n</sub>-RF; RF = fluoroalkyl groups; M = radical polymerizable monomers] can form nanometre size-controlled self-assembled oligomeric aggregates through the aggregations of end-capped fluoroalkyl groups. Fluoroalkyl end-capped oligomeric aggregates can also interact with guest molecules to afford fluorinated aggregate/guest molecule nanocomposites; although the corresponding non-fluorinated oligomers cannot form such molecular aggregates to interact with guest molecules. For example, silica nanoparticles should act as guest molecules in fluorinated oligomeric aggregate cores to give new fluorinated oligomer-coated silica nanoparticles (fluorinated oligomer/silica nanocomposites). In these fluoroalkyl end-capped oligomers/silica nanocomposites, some fluorinated oligomers/silica nanocomposites were found to exhibit no weight loss behavior corresponding to the contents of oligomers in the silica matrices even after calcination at 800 oC. Fluoroalkyl end-capped vinyltrimethoxysilane oligomer-coated silica nanoparticles can be prepared by the sol-gel reaction of the corresponding fluorinated oligomer under alkaline conditions. The modified glass surface treated with this fluorinated oligomeric nanoparticle exhibited a completely super-hydrophobic characteristic. These fluorinated nanoparticles were also applied to the surface modification possessing a super-oleophobic characteristic. Not only fluoroalkyl end-capped oligomers but also low molecular weight fluorinated surfactants such as perfluoro-1,3-propanedisulfonic acid (PFPS) were applied to the preparation of fluorinated surfactants/silica nanocomposites to give no weight loss in proportion to the content of the surfactants in the nanocomposites even after calcination at 800 oC.

**Keywords :** fluorinated oligomer, silica nanocomposite, nonflammable characteristic, superamphiphobic characteristic

**Conference Title :** ICCMS 2015 : International Conference on Chemistry and Materials Science

**Conference Location :** Zurich, Switzerland

**Conference Dates :** July 29-30, 2015