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A facile one-step approach to silica superhydrophilic film with hierarchical structure using fluoroalkylsilane

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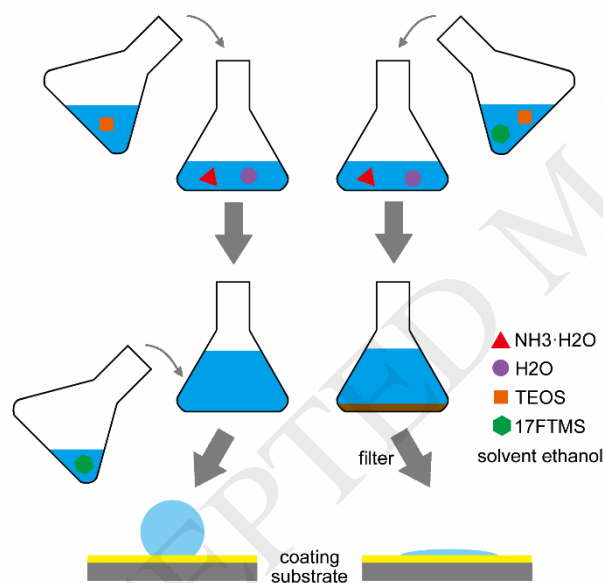
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Graphical Abstract



Abstract: Highly hydrophobic or superhydrophilic silica films can be fabricated on glass substrates, by adding the same fluoroalkoxysilane named (heptadecafluoro-1,1,2,2-tetrahydrodecyl)trimethoxysilane (17FTMS) after or during Stöber process. In the current study, difference in approach is using 17FTMS only as a modification reagent for silica nanoparticles or mixing 17FTMS with TEOS together as silicon precursor. Contact angles (CA) of these two samples are 142.7° and 8.2°, respectively. The water-repellent property of highly hydrophobic silica film is provided by the fluorocarbon chains which chemically bond to silica spheres. The condition is quite different as for superhydrophilic silica nanoparticles: two kinds of particles with diverse diameter of 20 nm and 250 nm coexist and fluorine is mainly found in large particles. In this case, fluoroalkylsilane indirectly helps to form a

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