North-East Research Conclave

Sustainable Science and Technology **Extended Abstract** **May 20-22, 2022**

Track: MT

Electrolyte-assisted Greener Approach for the Synthesis of Silica Nanoparticles

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Silica nanoparticle is gaining tremendous importance now-a-days because of its wide application across different domains like drug delivery, chromatography, biosensor, and chemo sensor. Synthesis of silica nanoparticles generally requires high percentage of organic solvent composition in strong basic media. Synthesis of silica nanoparticles in bulk amount in greener way will not save the environment as well as it is cost-effective. Herein, efforts have been made to minimize the concentration of organic solvents during the synthesis via addition of a low-concentration of electrolytes., e.g., NaCl. The effect of electrolytes and solvent concentrations on nucleation kinetics, particle growth, and particle size are investigated. Ethanol is used as a solvent in various concentrations ranging from 60% to 30%. To assess particle size and polydispersity, isopropanol and methanol are also utilized as solvents. The concentration of aqua soluble silica is determined using the molybdate assay to establish the reaction kinetics, and this approach is also utilized to quantify the relative concentration change in particle throughout synthesis. Interesting, the organic solvent composition can be reduced up to 50% using 68 mM NaCl. The surface zeta-potential is reduced after addition of an electrolyte, which makes the condensation process faster and helps to reach the Critical Aggregation Concentration. The effect of temperature was also monitored, and we obtained homogeneous and uniform nanoparticles by increasing the temperature. Thus, it is possible to tune the size of the nanoparticles by changing the concentration of electrolytes and temperature of the reaction condition in a much green approach. The overall cost of the synthesis also can be reduced to ~35% by the addition of electrolyte.

Reference.

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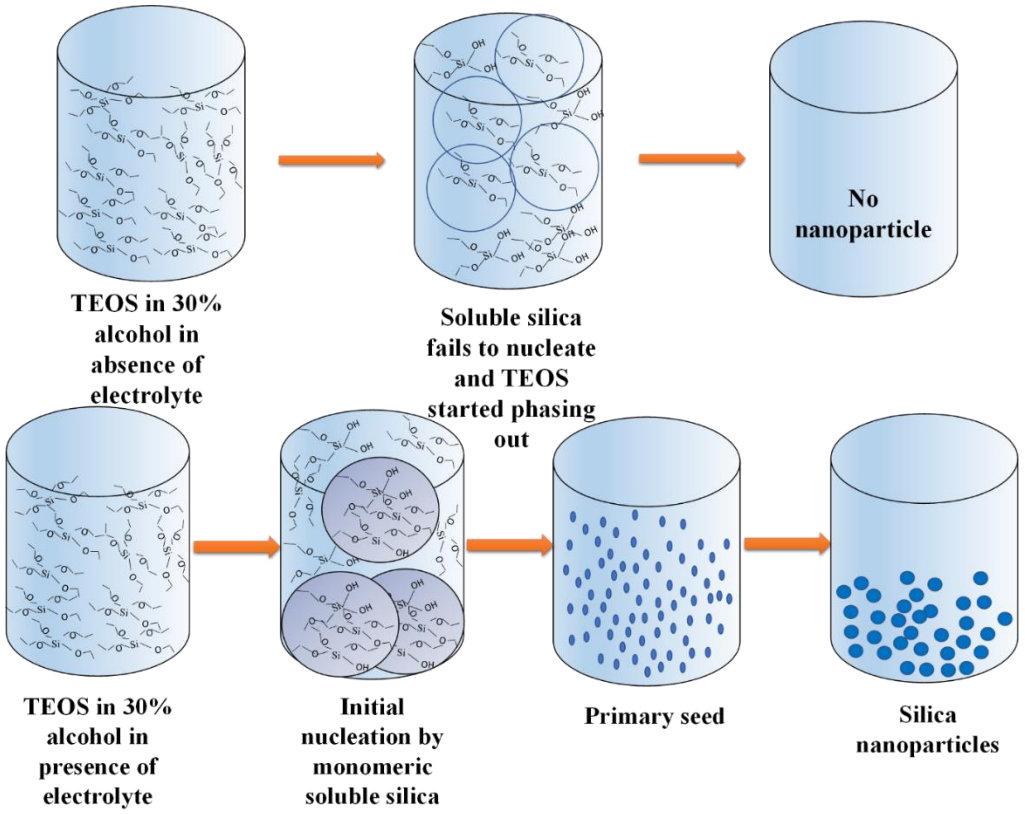

Figure 1. Overview for the green synthesis of silica nanoparticles comprising low organic solvent mixture