

A facile synthesis of amorphous silica nanoparticles by simple thermal treatment route

ABSTRACT

A facile thermal treatment route was for the first time used to successfully synthesize amorphous silica nanoparticles. Various techniques were employed to study the structural, phase and elemental composition of the material at different calcination temperature between 500–750°C. The XRD analysis confirms the formation silica to be in an amorphous state and further revealed that the material remained in amorphous state even when calcined at 750°C. The FT-IR spectra shows that the calcination process has enable the removal of organic source from PVP and formation of amorphous silica nanoparticles. The average particle size of the material estimated from the TEM images shows that the particle were <10nm. The optical absorbance exhibited in the UV region reveals amorphous silica nanoparticles possess a wide band gap ranging from 3.803– 4.126eV calcined between 500 to 750°C. The EDX analysis has confirmed the presence of Si and O as the only elements in the material formed, which implies thermal treatment method is effective for the synthesis of amorphous silica nanoparticles.

Keyword: Amorphous silica; Calcination; Optical