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Colloids and Surfaces A: Physicochemical and Engineering Aspects

journal homepage: www.elsevier.com/locate/colsurfa



Effects of solvents on the stability and morphology of CTAB-stabilized silver nanoparticles

Zaheer Khan^{b,*}, Shael Ahmed AL-Thabaiti^a, Abdullah Yousif Obaid^a, Ziya Ahmad Khan^a, Abdulrahman O. Al-Youbi^a

^a Department of Chemistry, Faculty of Science, King Abdul Aziz University, P.O. Box 80203, Jeddah 21413, Saudi Arabia

^b Department of Chemistry, Jamia Millia Islamia, Jamia Nagar, New Delhi 110025, India

ARTICLE INFO

Article history:

Received 30 June 2011

Received in revised form

12 September 2011

Accepted 14 September 2011

Available online 21 September 2011

Keywords:

Cysteine

Silver nanoparticles

Dielectric constant

Solvents

ABSTRACT

We report the effects of polar-protic and polar-aprotic solvents on absorption spectra and particle size of surfactant stabilized silver nanoparticles. Cysteine and cetyltrimethylammonium bromide, CTAB were used as the reducing and stabilizing agents, respectively. The prepared orange color silver sols possess an unusually narrow Plasmon absorption shoulder at 450 nm. The absorbance and shape of this shoulder are affected by protic (methanol, ethanol) and aprotic (acetonitrile, DMF, DMSO and 1,4-dioxane) solvents. The observed results are interpreted in terms of the dielectric constant, boiling point, hydrogen bonding, solubilization and donation of electron density from the silver particles to the solvents. Absorbance increases with increasing the dielectric constants of reaction mixture. The particle size decreases with decreasing the hydrophobic character of protic solvents: particle size = 70, 58 and 39 nm in presence and absence of solvents (ethanol and methanol), respectively.

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