

Synthesis and stabilization of silver nanoparticles by the polyol process

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Synthesis of silver nanoparticles with well-controlled size distribution is very important in many practical applications. In this work, silver nanoparticles have been synthesized by the polyol process. Dispersions of colloidal silver nanoparticles have been prepared by the reduction of silver nitrate in ethylene glycol with the polyvinylpyrrolidone (PVP) as the steric stabilizer. To understand the effect of reaction parameters on the size of silver nanoparticles, we varied the temperature, reaction time, amount of silver nitrate in synthesis. Quasi-elastic light scattering (QELS) technique and transmission electronic microscopy (TEM) were used to observe the average diameter and morphology of silver nanoparticles, respectively. Our results indicate that spherical silver nanoparticles with the average diameter between 5 and 60 nm could be successfully synthesized by controlling the reaction parameters. We also determined the condition at which the synthesized silver nanoparticles were colloidally stable for several days in phosphate buffer solution for toxicity study.