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Characteristics of colloidal Ag nanoparticles in polyvinyl alcohol with different molecular weight

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Colloidal Ag nanoparticles are of interest for many researchers due to their vast potential applications. In this work, the colloidal Ag nanoparticles were prepared in the polyvinyl alcohol (PVA) solution as a capping agent using ascorbic acid as reducing agent. PVA with a molecular weight of 13,000-23,000 (PVA-I) and 145,000 (PVA-II) was used. The concentration of silver nitrate and ascorbic acid was set at 3.0 x 10^{-4} mol L^{-1} and 6.0 x 10^{-4} mol L^{-1}, respectively. The reaction between Ag^{+} ion and ascorbic acid in PVA was performed at 80°C. After 5 min of heating, the solution color changed from colorless to yellow to indicate the formation of silver nanoparticles. The optimum concentration of PVA-I and PVA-II was found to be 1.0% and 0.25%, respectively. The surface plasmon resonance (SPR) absorbance of the colloid in PVA-I has λ-max of 416 nm, with full-width-half-maximum of 94 nm. The SPR absorbance of the colloid in PVA-II has λ-max of 413 nm, with full-width-half-maximum of 73 nm. The colloids are stable for four weeks, which show a decrease in the SPR absorbance by 10.57% in PVA-I and 8.45% in PVA-II. Using PVA-II, the synthesis required a lower concentration than that of using PVA-I. The colloidal Ag nanoparticles in PVA with high molecular weight have smaller particle size than that in PVA with lower molecular weight.

Biography

Bella Mellisani completed her undergraduate program in Chemistry at Tanjungpura University. Currently, she is working on her MSc Program in Chemistry at Gadjah Mada University Yogyakarta, Indonesia. She receives scholarships from The Indonesia Endowment Fund for Education, Ministry of the Finance Republic of Indonesia. Her work focuses on the synthesis of functional nanoparticles.

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