

Interactions between the Tetrachloroaurate(III) Ion and Alkyltrimethylammonium Ions and Micelles

T. Tominaga^{C, S}, H. Iwata, T. Yasugi, and M. Takezaki

Department of Applied Chemistry, Okayama University of Science, Okayama, Japan
tominaga@dac.ous.ac.jp

In the liquid phase, gold nanoparticles are prepared by reducing tetrachloroaurate(III) (AuCl_4^-) to $\text{Au}(0)$. To control the crystal growth and to stabilize the nanoparticles formed in solutions, protective agents such as ligands, surfactants, and polymers are used. It is important to elucidate interactions between the tetrachloroaurate ion and protective agents to understand the mechanism of the crystal growth in an early stage of the nanoparticle formation.

In this study, we examine interactions between the tetrachloroaurate ion and a series of alkyltrimethylammonium (C_nTA^+) ions and micelles. Using surfactant ion-selective electrodes, free monomer-ion concentrations of C_nTA^+ were determined in the presence of AuCl_4^- . During the reduction processes of Au(III) to $\text{Au}(0)$, free C_nTA^+ monomer concentrations were measured. Furthermore, by measuring the diffusion coefficient of the AuCl_4^- ion in C_nTABr micellar solutions, the degree of binding of AuCl_4^- to the micelles were estimated.