

Electrochemical analysis of silver nanoparticle impacts at the surface of a microelectrode

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Silver, a well-known precious metal, is utilized for its antimicrobial properties in sports clothing and other consumer items in the form of silver nanoparticles; however, there is still much to be learned about the properties of these particles. Nanoparticle research has applied electrochem. methods to investigate the kinetics and mechanisms of oxidation, as well as to characterize the silver nanoparticles. However, minimal studies have explored the interaction of silver particles with an electrode's surface. This research explores the time-dependent interactions of single silver nanoparticles with the surface of a platinum working electrode. By observing how the particle oxidation frequency changes with the concentration gradient at the electrode surface, interactions with the surface of the electrode can be probed. The interactions of silver nanoparticles with their surrounding environment can also be observed electrochem. Electrode potential and electrolyte contributions to the oxidation rate of silver nanoparticles were explored alongside with the time-dependent oxidation of silver particles at the electrode surface. For example, particle aggregation induced by the electrolyte was observed during later parts of the electrochem. experiments indicated by charge being passed for single impacts. Understanding the chem. of the particle-surface interaction is essential in further development of electrochem. methods to characterize individual nanoparticles, which can lead to the development of more efficient sensors, catalysts, and fuel systems that use nanoparticles. Addnl., better understanding of the interaction that silver particles have during oxidative impacts will lead to better methods that can associate the unique reactivity of each silver nanoparticle to its size and shape for a given environment.