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Streaming current for particle-covered surfaces: simulations and experiments[1] JERZY BLAWZDZIEWICZ, Texas Tech University, ZBIGNIEW ADAMCZYK, Institute of Catalysis and Surface Chemistry, Polish Academy of Sciences, Cracow, Poland, MARIA L. EKIEL-JEZEWSKA, Institute of Fundamental Technological Research, Polish Academy of Sciences, Warsaw, Poland — Developing *in situ* methods for assessment of surface coverage by adsorbed nanoparticles is crucial for numerous technological processes, including controlling protein deposition and fabricating diverse microstructured materials (e.g., antibacterial coatings, catalytic surfaces, and particle-based optical systems). For charged surfaces and particles, promising techniques for evaluating surface coverage are based on measurements of the electrokinetic streaming current associated with ion convection in the double-layer region. We have investigated the dependence of the streaming current on the area fraction of adsorbed particles for equilibrium and random-sequential-adsorption (RSA) distributions of spherical particles, and for periodic square and hexagonal sphere arrays. The RSA results have been verified experimentally. Our numerical results indicate that the streaming current weakly depends on the microstructure of the particle monolayer. Combining simulations with the virial expansion, we provide convenient fitting formulas for the particle and surface contributions to the streaming current as functions of area fractions. For particles that have the same ζ-potential as the surface, we find that surface roughness reduces the streaming current.

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