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In situ electrochemical small-angle neutron scattering (eSANS) for quantitative structure and redox properties of polymer-coated nanoparticles[1] VIVEK PRABHU, Polymers Division, NIST, VYTAS REIPA, Biochemical Sciences Division, NIST, PETER BONNESEN, ADAM RONDINONE, ERIC FORMO, Center for Nanophase Materials Sciences, ORNL — Rapid growth in nanomaterial applications (energy, cosmetics and healthcare products) highlights limitations of available physicochemical characterization methods. An in situ electrochemical small-angle neutron scattering (eSANS) methodology was devised that enables direct measurements of nano and colloid material dispersion structure while undergoing reduction-oxidation (redox) reactions. By combining the electrochemical signal with contrast variant SANS, the structure of the polymer-nanoparticle complexes can be examined under electrochemical conditions. Specially-synthesized poly(ethyleneglycol)-stabilized zinc oxide nanoparticles were examined by eSANS showing an irreversible change in nanoparticle-complex structure during the potential cycle. We will report on the kinetics of the nanoparticle transformation as measured at BL-6 EQSANS, Spallation Neutron Source, Oak Ridge National Laboratory.

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