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In Situ Surface Enhanced Infrared Absorption Spectroscopy for the Analysis of the Adsorption and Desorption Process of Au nanoparticles on the SiO2/Si Surface D. ENDERS, T. NAGAO, T. NAKAYAMA, National Institute for Materials Science, ICORP-JST — The adsorption and desorption of Au nanoparticles (AuNP) in colloidal D2O suspension on the APTES treated SiO2/Si surface was investigated by in situ ATR-IR spectroscopy. With increasing surface density of AuNP the absorption of the vibrational modes of D2O and of the citrate molecules covering the AuNP increases due to surface enhanced infrared absorption (SEIRA). We show that the adsorption kinetics can be investigated by monitoring in situ the molecular vibrational modes of D2O and the citrate molecules, and furthermore we clarify that the adsorption process can be described very well by a diffusion-limited first-order Langmuir-kinetics model. When exposing a saturated AuNP submonolayer to 2-aminoethanethiol (AET)/D2O solution, the AuNP are removed from the surface and the IR absorption of the D2O vibrational modes become weaker again. Taking into account the time dependencies of the CH and the OD peaks, we propose a microscopic model, where the AET molecules quickly adsorb on the AuNP by replacing most of the precovering citrate molecules exposed to the AET solution. As this takes place, the AuNP are finally removed from the surface.

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