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Non-Equilibrium Effect on Adsorption of Gold Nanoclusters Grown on *p*-Aminothiophenol Self Assembled Monolayer on Gold Substrates DIPTI SHARMA, MARINA RUTHS, UML — This study explores the adhesion mechanism of gold nanoparticles (30 nm) tethered on gold substrates (100 nm) via self-assembled monolayers (SAMs) of *p*-aminothiophenol (ATP) using AFM and SEM. Adsorption of nanoparticles was studied as a function of **immersion time** (0**,** 12, 24, 48 & 72 h) **suspension concentration** ($1.28*10^{-10}$M, $2.56*10^{-10}$M) and **pH (**3, 4 in citrate buffer). The number of adsorbed nanoparticles increased as dipping time in the suspension increased and reached to the maximum value, hit the maximum, then decreased and showed a peak. This peak moved to lower time (by 12 h) as concentration of particles increased (doubled). As pH value increased from 3 to 4, peak shifted from 24 h to 48 h. We ascribe this to an electrostatic interaction between citrate-stabilized negatively charged nanoparticles and the protonated amino group of ATP. This interaction allows the nanoparticles to migrate and form clusters on the surface during long immersion times in the nanoparticle suspension and the stages of adsorption make the surface in non equilibrium state. As a control, 1,9-nonanedithiol (NDT) can be used at the place of ATP to avoid this non-equilibrium state on the surface.

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