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Frontiers at Interfaces

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Interfacial acid-base equilibrium of carboxyl groups tethered to gold nanoparticles is a key factor that stabilizes gold nanoparticles in aqueous solution. In this study we used Second Harmonic (SH) generation to measure interfacial potential and interfacial pH, and thereby obtained a surface pKa value of 3.30.1 for the carboxyl group at a gold nanoparticle/aqueous interface. This pKa value is smaller than its bulk counterpart in aqueous solution, which suggests that the charged carboxyl group is favored at the gold nanoparticle surface. The SH findings that the pKa of the carboxyl group at the gold nanoparticle/water interface is more acidic than carboxyls free in bulk solution, is consistent with the effects of the noble metal (gold) surface on a charge in solution, as predicted by the method of images.