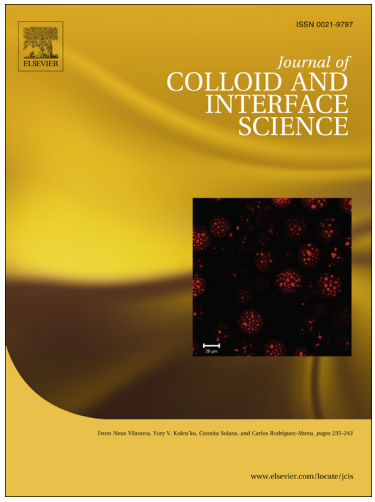

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Sub-Monolayer Silver Loss from Large Gold Nanospheres Detected by Surface Plasmon Resonance in the Sigmoidal Region

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Abstract

Nanosilver becomes labile upon entering the human body or the environment. This lability creates silver species with antimicrobial properties that make nanosilver attractive as active components in many consumer products, wound dressings, and agricultural applications. Because lability depends strongly on morphology, it is imperative to use a material with constant lability throughout kinetic studies so that accurate lability data can be acquired with efficient detection. Here 2.5 nm thick Ag was coated onto on 90-nm diameter gold nanosphere cores and this surface silver layer was gradually removed by either chemical or X-ray radiation etching. The most sensitive region of a sigmoidal surface plasmon resonance (SPR) response as a function of silver thickness was found for the first time between 0.9- and 1.6-nm thick silver, revealing a new nanosilver standard for lability studies. The SPR peak position detection sensitivity is 8 nm (SPR peak shift)/nm (silver thickness change) within this steepest region of the plasmon response curve whereas outside sensitivity drops to 1 nm/nm. Since the centroid of