Charge transfer between sensing and targeted metal nanoparticles in indirect nanoplasmonic sensors

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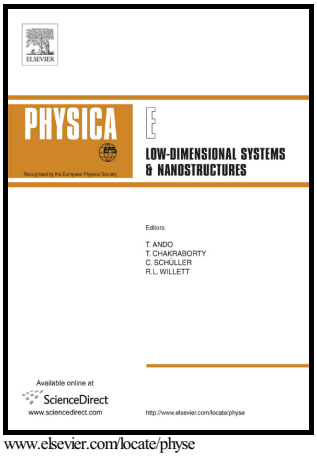

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Charge transfer between sensing and targeted metal nanoparticles in indirect nanoplasmonic sensors

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Abstract

In indirect nanoplasmonic sensors, the plasmonic metal nanoparticles are adjacent to the material of interest, and the material-related changes of their optical properties are used to probe that material. If the latter itself represents another metal in the form of nanoparticles, its deposition is accompanied by charge transfer to or from the plasmonic nanoparticles in order to equalize the Fermi levels. We estimate the value of the transferred charge and show on the two examples, nanoparticle sintering and hydride formation, that the charge transfer has negligible influence on the probed processes, because the effect of charge transfer is less important than that of nanoparticle surface energy. This further corroborates the non-invasive nature of nanoplasmonic sensors.

Keywords: Nanoplasmonic sensors; Supported metal nanoparticles; Charge transfer; Ostwald ripening; Hydrogen storage

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