

Indirect nanoplasmonic sensing

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Indirect nanoplasmonic sensing (INPS) lets us to follow the adsorption of gases by a sensor composed of chemically active nanoparticles deposited onto a regular array of gold nanodisks fabricated using electron-beam lithography. We measured visible and infrared optical absorption spectra corresponding to localized surface plasmon resonance (LSPR) signals of the gold disks. While the gas molecules are adsorbed onto nanoparticles, the changes in the refractive index and other properties of the nanoparticle surfaces result in a spectral shift of the signal absorption maxima of LSPR corresponding to the underlying gold disk sensor [1].

We illustrate this work by adsorption of water vapor molecules on both hydrophilic and hydrophobic soot nanoparticles quantitatively followed by a calibrated INPS sensor [2] and we will give some perspectives concerning catalytic heterogeneous reactions. Indeed INPS coupled to mass spectrometry is a method of choice to characterize quantitatively and with a high sensitivity the reactivity of gases (CO, NO_x, ...) with metallic nanoparticles (Pt, Pd, ...) involved in catalysis.

References

- [1] E. M. Larsson, C. Langhammer, I. Zoric, B. Kasemo, *Science* **326**, 1091-1094 (2009).
- [2] B. Demirdjian, F. Bedu, A. Ranguis, I. Ozerov, A. Karapetyan and C. R. Henry, *The Journal of Physical Chemistry Letters* **6**, 4148-4152 (2015).