PHONON EFFECTS IN PLASMONIC SPECTRA

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Plasmonic resonances of metallic nanowires in the infrared are well known to be beneficial for vibrational sensing of molecules. They are also very sensitive to phononic excitations, which in case of strong coupling to phonon-polaritons leads to qualitatively different spectral behaviour. What has been considered only seldom is the influence of the metal phonons on the plasmonic resonance. In the infrared, the measurement of plasmonic resonances allows to obtain valuable quantitative information on the conductivity of the wires.[1] For example, our study of the temperature dependent plasmonic resonance spectrum of nanowires with a high crystalline quality revealed a phononic damping of the electronic excitation that with temperature increases, the stronger the thinner the wires.

Keywords: Infrared plasmonics; electronic damping; phonons; nanostructures

References

[1] T. Neuman, C. Huck, J. Vogt, F. Neubrech, R. Hillenbrand, J. Aizpurua and A. Pucci, J. Phys. Chem. C 119 (2015) 26652.