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Title: Surface plasmonics in surfaces patterned/structured by nanoparticles

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In recent years, interest in nanopatterned surfaces has been increasing. One of the reasons for this is the possibility of producing surfaces with specific optical or plasmonic properties. In this work we study the case where a surface is patterned by linear chains of spherical nanoparticles of sub-wavelength size. In particular, we investigate at which point the transverse plasmonic interactions become weak compared to the longitudinal interactions. Computationally, we solve this problem in the quasi-static approximation by expansion of the potential in spherical harmonic functions. Using these results as inputs to an effective medium based calculation, our approach also gives the reflectance of the nanopatterned surface, and the reflectance shows the plasmon resonances associated with interactions between the nanoparticles. As such, sub-wavelength particles can be used to tune the reflectance of a surface, and shows interesting effects on the polarization of the reflected light.