In search of optimal performance for surface-plasmon Bragg mirrors

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From the theoretical side, the calculation of electromagnetic fields on a metal surface in the optical regime is a well-defined but difficult problem that requires a trade-off between ambition and numerical cost, as well as between quantitative and qualitative descriptions of the system under consideration. In the last five years, we have made use of the modal expansion technique in order to reach such a difficult balance when dealing with the scattering of surface plasmon-polaritons by one-dimensional nano-indentations [1-3]. Here, we continue our journey towards quantitative description of surface-plasmon Bragg mirrors by extending our study to the case in which surface impedance boundary conditions are applied to all metal/dielectric interfaces.

More precisely, we have carried out extensive numerical simulations with the aim of determining the set of geometrical parameters (depth, width and position of the indentations) that provide optimal performance under given fabrication and operation conditions. In addition to global figures of merit, we have also studied the relative influence of different parameters, which can be understood in terms of cavity mode excitation and in-phase reemission [4].

References:

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