BEM simulations of the optical response of metallic island films on dielectric substrates

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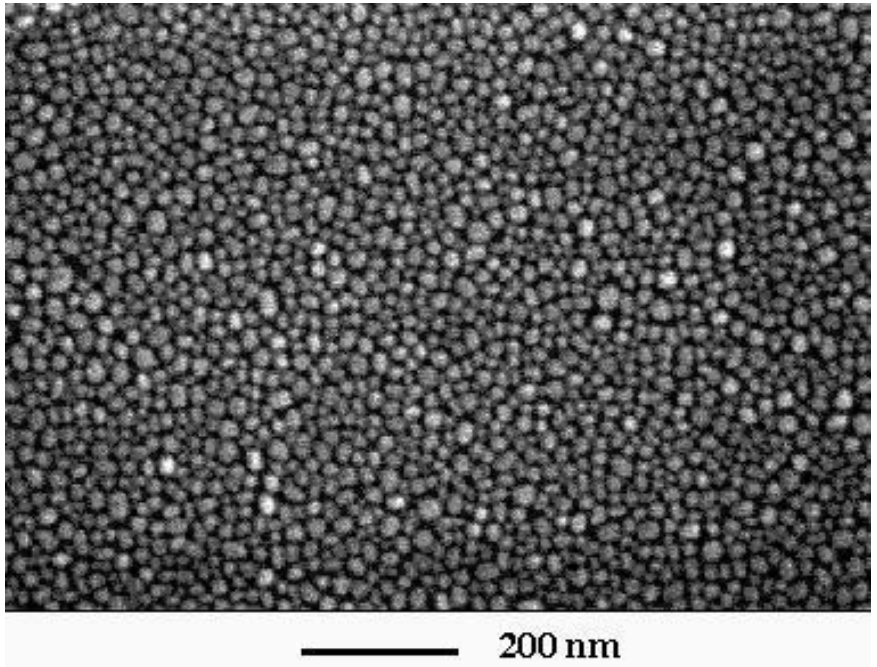
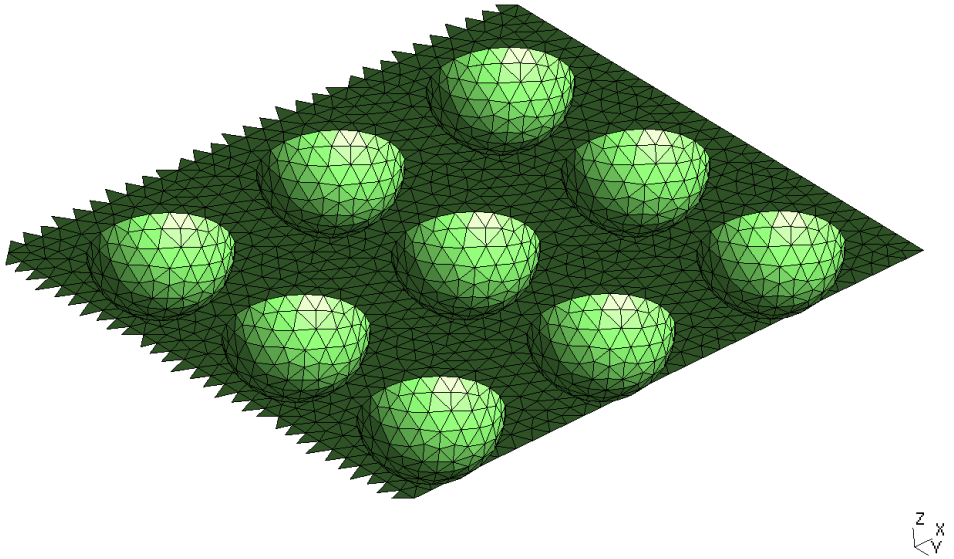
System of interest: metallic island film on dielectric substrate



From: I. Simonsen, R. Lazzari, J. Jupille, and S. Roux, *Numerical modeling of the optical response of supported metallic particles,* Phys. Rev. B 61, 7722 (2000)



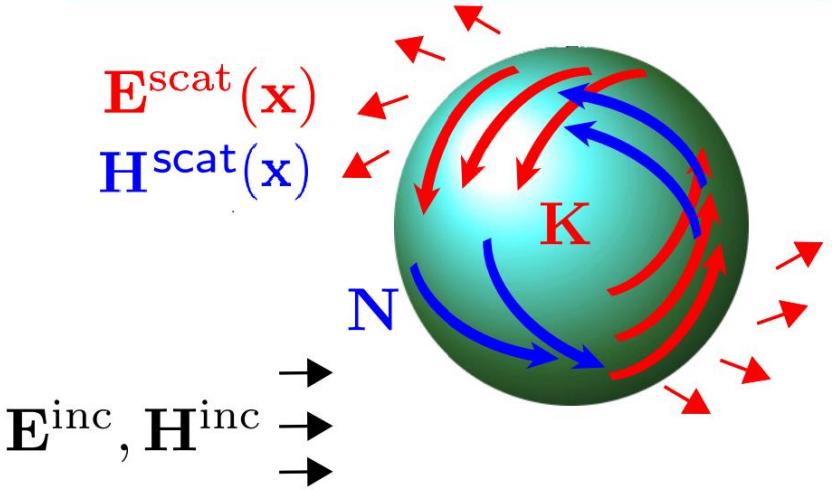
Boundary element approach to electrodynamics

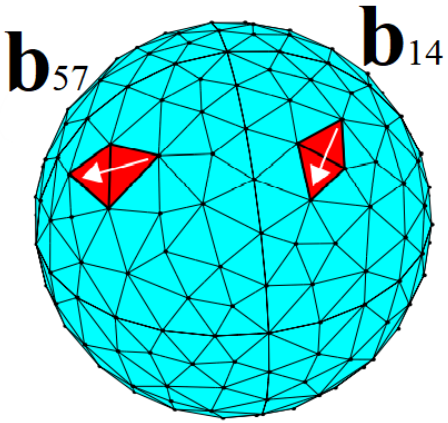
$$\begin{pmatrix}\vec{E}(\vec{x})\\ \vec{H}(\vec{x})\end{pmatrix}^{\text{scat}}_{||} = \left[\int_S \begin{pmatrix}\mathbf{G}^{\text{EE}}(\vec{x},\vec{x}') & \mathbf{G}^{\text{EM}}(\vec{x},\vec{x}')\\ \mathbf{G}^{\text{ME}}(\vec{x},\vec{x}') & \mathbf{G}^{\text{MM}}(\vec{x},\vec{x}')\end{pmatrix}\cdot\begin{pmatrix}\vec{K}(\vec{x}')\\ \vec{N}(\vec{x}')\end{pmatrix}\mathrm{d}\vec{x}'\right]_{||} = -\begin{pmatrix}\vec{E}(\vec{x})\\ \vec{H}(\vec{x})\end{pmatrix}^{\text{i}}_{||}$$

$$\begin{pmatrix}\vec{K}(\vec{x})\\ \vec{N}(\vec{x})\end{pmatrix} = \sum_\alpha \begin{pmatrix}k_\alpha\\ n_\alpha\end{pmatrix}\vec{b}_\alpha(\vec{x})$$

$$\mathbf{M}\vec{k} = \vec{v}$$

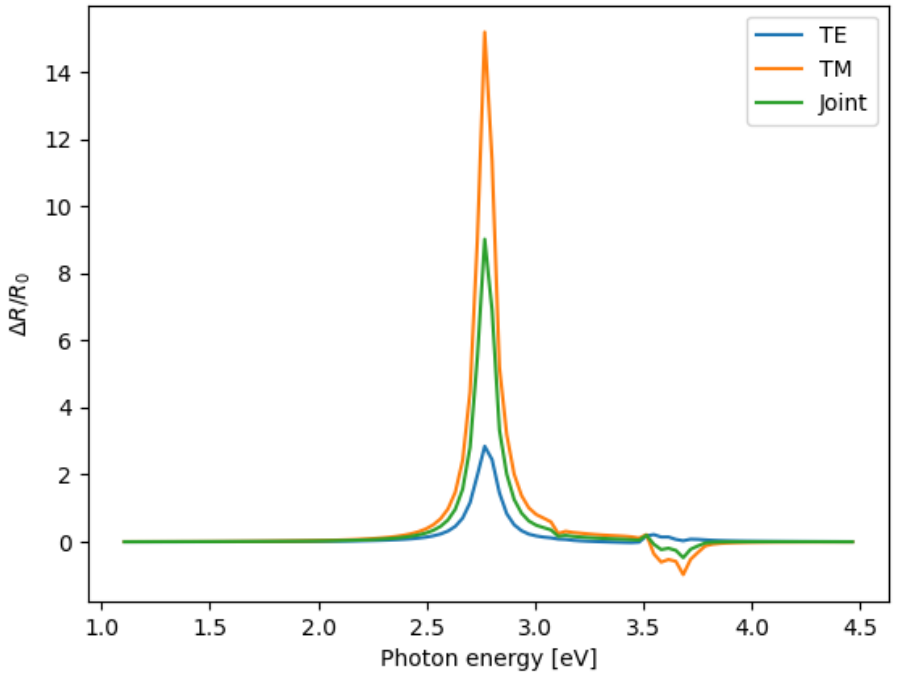
Linear system!!

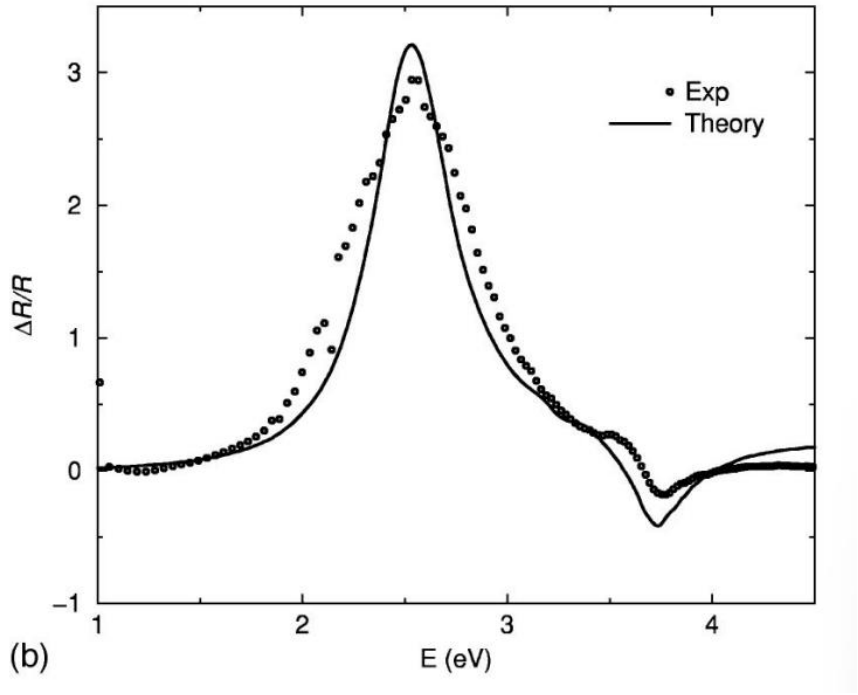




From: https://docplayer.net/152607789-Surfacecurrent-field-formulation-of-electromagnetism-the-one-slide-compactification-of-this-talk.html (downloaded 01.12.2022, 13:10)

Results: Ag on MgO





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- Peak and valley due to localised surface plasmon resonances
- Different peak positions: not yet implemented size effects
- Different magnitudes: ????