TECHNISCHE UNIVERSITÄT WIEN

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Invitation

The resonant behavior of a single plasmonic helix

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Chiral plasmonic nanostructures will be of increasing importance for future applications in the field of nano-optics and metamaterials. Their sensitivity to incident circularly polarized light in combination with the ability of extreme electromagnetic field localization renders them ideal candidates for chiral sensing and for all-optical information processing either based on the spin angular momentum of light or based on its strong nonlinear response. Here, the resonant modes of single plasmonic helices are investigated. We find that a single plasmonic helix can be efficiently excited with circularly polarized light of both equal and opposite handedness relative to the handedness of the helix. An analytic model provides resonance conditions matching the results of full-field modeling. The underlying geometric considerations explain the mechanism of excitation and deliver quantitative design rules for plasmonic helices being resonant in a desired wavelength range. Based on the developed analytical design tool single silver helices were fabricated and optically characterized. They show the expected strong chiroptical response to both handednesses in the targeted visible range. The thereby experimentally realized dissymmetry factor is the largest obtained for single plasmonic helices in the visible range up to now.

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