Chiral plasmonic surfaces

Background Context

A *metamaterial* is generally an *artificial material* with properties nominally not found in nature. The negative index (Vesalago) superlens described by Pendry, turns out to be quite difficult to manufacture. However, chiral metamaterials that may have a negative refractive index for circular polarized light, and these materials appears somewhat easier to fabricate. Another important property of chiral plasmonic nanostructured, is the possibility of producing resonant enhancement of circular polarized light.

Student Project Description

The student will in this project study the main concepts behind chiral metamaterials. The student will manufacture arrays of chiral plasmonic structures using the NTNU nanolab facilities, and in particular focus on coupled resonator structures with a strong chirality. The structures will in the first part of the project be systematically characterized by spectroscopic Mueller Matrix Ellipsometry, while in the second part of the project will focus on applications and a wider range of optical characterization techniques. The student may depending on interest also be involved in performing modelling of the structure using COMSOL or FDTD simulations.

Responsibilities and Skills

The student must assist in the nanolab courses during the autumn, and be interested in nanolab work. The student must learn to operate either the FIB tool or the EBL and the IBS tool, and to perform deposition and characterization. It can be relevant to also combine with nanosphere lithography.

The student must learn to operate the spectroscopic Mueller Matrix Ellipsometer and understand the Multilayer formalism for modelling optical gyrotropy.

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