Welcome to Foton lab: Plasmonics and Photonics Activity

In Plasmonics and Photonics area, Foton lab at TIFR investigates light modulation and control of optical properties in nanopatterned metal-dielectric and dielectric structures.

Nanopatterns conforming to crystals, quasicrystals or aperiodic patterns are designed to have unique properties. We fabricate and study these structures.

We study light localization for quantum information processing, controlling light emission and light modulation for nanophotonic and optical planar integrated circuits and modulation of optical properties of materials.

Metal-dielectric structures

Surface plasmon polaritons (SPPs) are charge density waves at the metal-dielectric interface. SPP excitation and resultant strong local field is useful for manipulating the optical properties of materials and light itself. We design, fabricate and study metal-dielectric structures.

With emphasis on light harvesting, broadband and near dispersionless plasmon excitation is demonstrated in plasmonic crystals and quasicrystals.

We demonstrated plasmon mediated giant enhancement of magneto-optical properties.

Enhanced light emission from semiconductors and light modulation in plasmonic crystals are some of the topics we are currently working on.

Dielectric structures

Periodic dielectric structures in the form of multilayers or 2-d air hole patterns on semiconductors (photonic crystals) are actively pursued.

Reflectionless potential profiles are demonstrated for broadband reflectionless transmission as well as superluminal transmission.

Cross waveguides about single quantum dots demonstrated for measuring the complete polarization state of the emitted light.

Photonic crystal high-Q microcavity with quantum dot as defect is designed and being pursued for quantum information processing.