



The Hebrew University Center
for Nanoscience & Nanotechnology



Nano Seminar

Multispectral and nonlinear optics with nanostructured artificial optical materials

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Abstract:

Nano-structuring allows to design the macroscopic optical behavior of materials. In my talk I will present three different approaches to control light by nanostructured surfaces, also known as metasurfaces. First I will show a configuration of vertically stacked metasurfaces where each layer is constructed from a different optimal building block, e.g. different inclusion material and geometry, and is designed to perform a different functionality with minimal crosstalk between the layers. This scalable approach allows us to demonstrate experimentally functional spectral multiplexing of visible light. We specifically show an aberration corrected metasurface-based triplet lens for RGB colors in the visible, integrated elements for STED microscopy, and elements with anomalous dispersive focusing. In the second part of the talk, I will describe also nonlinear quadratic effects in metasurfaces. I will show how nonlinear metasurfaces open the door to a variety of light generation and manipulation schemes and to new fundamental studies in the realm of nonlinear optics. Specifically I will present a new study on quadratic nonlinear coherent coupling due to surface lattice resonance at the second harmonic. I will show that in this condition strong enhancement of the nonlinear polarizability of each of the particles in the array is obtained which leads to significantly enhanced second harmonic generation. Finally, I will discuss the ability to modify the optical properties of metasurfaces by hybridizing their optical modes with excitons. Specifically I will present a study on strongly coupled exciton-localized surface plasmons in metasurfaces of nanoantennas coated with molecular J-aggregates and show recent results of their ultrafast (and intriguing) temporal dynamics.

Gathering & Refreshments at 10:50

Please contact Alexandra Bannykh at 6584919 if you are interested in meeting the lecturer.

Tuesday, June 13th 2017, 11:00 at the Seminar Hall
Los Angeles Building, entrance floor.