

invites to a seminar by

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Introduction to novel crystal growth-based materials at CeNT - ITME and their potential applications

January 26 2017 at 1:00 p.m.

at the Centre of New Technologies, Banacha 2c,
room 0142 (ground floor)

Abstract: Novel research areas have been developed in the field of photonics: metamaterials and nanoplasmonics. By utilizing the ideas developed in these research areas and using specially-designed materials, unusual electromagnetic properties such as artificial magnetism, negative refractive index, cloaking and squeezing photons through subwavelength holes have been demonstrated. These novel fields need new material fabrication techniques, especially bottom-up approaches such as self-organization. Two novel bottom-up manufacturing methods will be presented: (i) method based on directionally-grown self-organized eutectic structures; and (ii) NanoParticles Direct Doping method (NPDD) based on directional solidification of dielectric matrices doped with various nanoparticles. In both cases we apply one of the crystal growth methods - the micro-pulling down method - to create the material. We demonstrated (i) volumetric materials with localized surface plasmon resonance at visible and IR wavelengths; (ii) materials with enhanced luminescence eg. at 1.5 μm wavelength, and up-conversion processes due to plasmonic resonances; (iii) material with subwavelength transmission at IR frequencies; (iv) materials with enhanced Faraday effect; and (v) materials for phonoanodes in photoelectrochemical cells for generation of hydrogen.