CONSIGLIO NAZIONALE DELLE RICERCHE
ISTITUTO NAZIONALE DI OTTICA

AVVISO DI SEMINARIO

Venerdi 7 marzo 2014 alle ore 11,00

l'Area della Ricerca CNR di Pisa, Aula 44, primo piano, Edificio "A"

il Dr. ***Luca MARMUGI***

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terrà un seminario sul tema:

Laser-enhanced Atomic Mobility and Nanoparticles Formation in Porous Glass

Abstract

Adsorption and desorption have a major influence on the surface interactions and hence on the details of atomic transport and diffusion, which are at the basis of many physical, chemical and biological phenomena. In particular, the possibility of controlling adsorption and desorption events is a tool for the macroscopic driving of the nano-systems evolution. In this talk, we will show that atomic diffusion inside the randomly oriented network of nanoporous glass can be modified by means of optical control of the adsorption/desorption events at the pores inner surface. Upon exposure to visible light, the atomic mobility is enhanced as a consequence of the so-called Light Induced Atomic Desorption (LIAD) effect. This increases the adsorption probability at surface defects where supported metastable metallic nanoparticles with definite geometry and size self-assemble. Consequently, the sample exhibits increasing absorption bands in the near-infrared spectrum. Recent results obtained with Potassium demonstrate that the details of the process are strictly dependent on the wavelength of the external illumination: light imposes different atomic mobility regimes with specific properties in terms of system evolution and nanoparticles formation. Control of the geometry distribution of nanoparticles can be achieved by properly varying the illumination wavelength and the exposure time. A deep connection is observed between the macroscopic response of the system and the details of the nano-scale dynamics driven by the light: results suggest a new method for the reversible laser-controlled production of metallic nanoparticles and indicate a possible path to the optical control of transport properties and to the test and validation of reaction-diffusion models in nanostructured environments.