Nanoplasmonics and surface enhanced spectroscopy

Visualization of surface plasmon by optical near-field induced mass-transport in amorphous chalcogenide films

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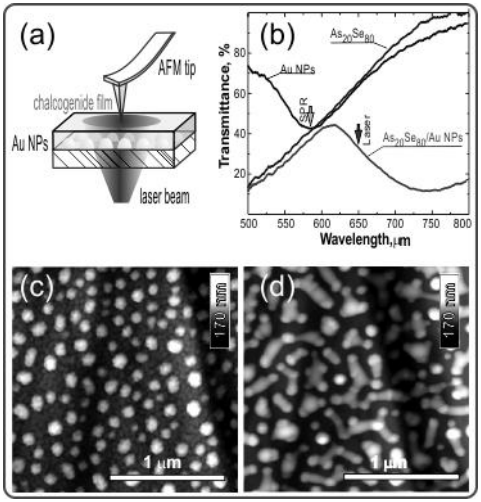

We report on sub-wavelength nanostructuring of light-sensitive films of amorphous chalcogenides (ACh) induced by a surface plasmon near-field. Se-enriched amorphous films (with the composition between As_5Se_{95} – $As_{25}Se_{75}$ are characterize by pronounced photoplastic effect and use for real-time optical recording of optoelectronic elements due to high anisotropic photofluidity and polarization-dependent mass-transport. We have established that mass-transport processes in these materials can be enhanced in the presence of localized plasmonic fields generated by light if the condition of surface plasmon resonance (SPR) is fulfilled. The near-field of surface plasmon generated by array of Au nanoparticles (Au NPs) interacts with the chalcogenide film that placed above it and reveals light-induced mass-transport. The variation in the surface topography were carried out in real time by *in-situ* atomic force microscopy (AFM) scanning and showed that it follows closely and permanently the underlying near-field radiation. It allows the mapping of surface plasmon intensity distribution, see Fig: sketch of experiment (a), optical transmittance spectra of appropriate Au NPs, pure ACh film and composite photosensitive structure (b), initial morphology (c) and nanostructurization of light-sensitive As-Se film by surface plasmon near-field irradiation (d).