The aim of this Mini-Colloquium (MC) is to share the most recent findings in the field of optical studies allowing the characterization of optical properties of nanostructured materials, both natural and manufactured. “Top-down” fabrication techniques, reaching new levels of miniaturization, as well as emerging “bottom-up” techniques, based on nanochemistry, have ensured a major progress in the preparation of nanostructured materials that are interesting in many applications dealing with the control and manipulation of light (Fig. 1). Spectroscopic techniques such as ellipsometry, reflectivity, Reflectance Anisotropy Spectroscopy and Reflectance Difference Spectroscopy are appropriate tools for the determination of the dielectric and magnetic functions, provided that the analysis and modeling methodologies are improved. Different models have been developed to analyze spectroscopic experimental data with emphasis on relating the microscopic geometry of the samples to their dielectric and magnetic functions. Such advances could also allow to use these spectroscopic techniques as new tools for structural characterization. Different groups worldwide are addressing the issue of the relation between nanostructure and the optical properties in different ways: the MC should open the discussion, considering recent developments in this field in terms of models, experimental results, as well as software developments.

Additional remarks
- The MC is open following the project : “Nanoparticules, fonctions diélectriques et Ellipsométrie” (NANODIELLIPSO), funded by the French National Agency (ANR) in the frame of its 2009 programme in Nanosciences, Nanotechnologies and Nanosystems (P3N2009).

Invited speakers
- B. Gralak, Institut Fresnel - Aix-Marseille University (Marseille, France)
- K. Hingerl, ZONA - Johannes Kepler University (Linz, Österreich)

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Figure 1: Scanning electron microscopy images of examples of metallo-dielectric nanostructures aimed at optical functions, by (a) top-down and (b) bottom-up techniques. In (a), a stack of four-gaps gold resonators obtained by a combination of e-beam lithography and thin film deposition is presented. In (b), a thin film of core-shell Ag/SiO$_2$ nanoparticles obtained by soft chemistry techniques and assembled using inverse Langmuir-Shaefer method is presented [1].

References