

## Contribution submission to the conference Dresden 2009

**Optical characterization of metal- dielectric- metal resonant systems** — ANDREAS ENGLISCH, •STEFAN GRIESING, and UWE HARTMANN — Experimental Physics, Saarland University, P.O. Box 15 11 50, D-66041 Saarbrücken, Germany.

Reflectivity and Raman measurements were carried out on the sandwich systems consisting of substrate- metal mirror- dielectric  $l/4$  resonator- metallic thin film, introduced in [1]. The thickness of the metallic cover layer has been varied from 1nm to 40nm. Its morphology was investigated by SEM and AFM. Measurements showed that the reflectivity of the system can be dramatically reduced for a certain spectral region. For a given thickness of the dielectric layer, the system exhibits a close-to-zero reflectivity for a cover layer being just at the percolation threshold, corresponding to a mass thickness of about 3nm. By varying the thickness of the cover layer, the width and position of the spectral regime of decreased reflectivity can be tuned. In contrast, by varying the thickness of the dielectric layer at a given thickness of the cover layer, the spectral position of the reflectivity minimum can be shifted due to the  $l/4$  condition. Raman measurements carried out on optical systems with percolating metallic cover layer revealed an intensity enhancement of up to four orders of magnitude. This result is compared with a model based on the effective refractive indices of the individual layers and local field enhancements of the metallic nanoparticles.

[1] J. Sukmanowski et al., J. Appl. Phys. 97, 104332 (2005).

**Part:** O  
**Type:** Vortrag;Talk  
**Topic:** Nano-optics of metallic and semiconducting nanostructures  
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