

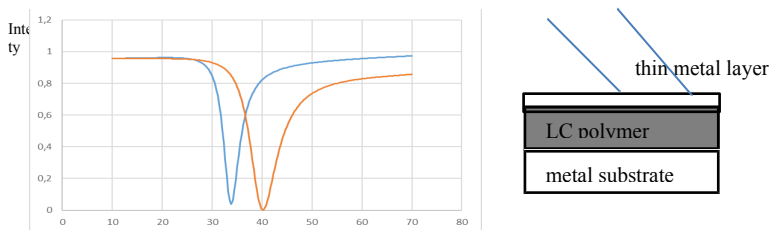
Nanoplasmonics and surface enhanced spectroscopy

Evanescent-wave dynamic gratings in liquid crystalline polymers at surface plasmon resonance

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We investigate the evanescent-wave gratings recorded holographically in the liquid crystalline (LC) polymers by use of the surface plasmon resonance. The LC polymers show properties of effective dynamic recording material of polarization type [1]. The evanescent-wave holograms with surface plasmon resonance can reconstruct true 3D color images when they are read out with white-light source satisfying the surface plasmon resonance conditions for each individual wavelength [2]. We consider a holographic recording of the evanescent-wave gratings in experimental setup based on Otto configuration. Two laser beams at surface plasmon resonance condition produce evanescent- waves that interfere in the recording material forming a grating. We use the sample structure without prism which allows obtaining surface-plasmon-like dips in both polarizations by optimizing the thickness of media and metal layer for achieving desirable color selectivity.



The layer configuration is shown in figure: Ag layer about 40 nm, LC polymer about 400 nm thickness. The angular spectrum of reflected radiation is also shown in figure. The dips in the angular spectrum allow studying the optical properties of the LC polymer material. The spectral selectivity of the evanescent-wave gratings can be tuned by the thickness of LC polymer layer [2]. Among those materials, chiral LC polymers are of peculiar interest for experimental study of photonic crystal structures, plasmonic holograms etc.

1. E.O. Berezniy, M.M. Burykin, S.G. Ilchenko, A.P. Ostroukh, R.A. Lymarenko. Dynamic holographic grating in liquid crystalline polymer // Conference Proceeding CAOL-2013.
2. Miyu Ozaki, Jun-ichi Kato and Satoshi Kawata. Color selectivity of surface-plasmon holograms illuminated with white light. // Applied Optics, Vol. 52, No. 27, 20 September 2013.