Design of high-pass multiband multilayer filter for Raman

S. Gaponenko, S. Kozhukh
B.I.Stepanov Institute of Physics, Belarus

Nanoplasmonic structures offer enormous enhancement of Raman scattering rate for molecules adsorbed on a nanotextured metal surface. This phenomenon principally can lead to development of palmtop Raman testers for certain practical applications. In such devices multiband haigh-pass filters are desirable with narrow transmission bands adapted for certain combination of laser wavelength and probe molecules. The potential applications include e.g. medical diagnostics. In this contribution we report on design of three-band high-pass multilayer filters aimed at oral cancer diagnostics. The filters сотефшт 24 and 27 layers and have transmission peaks at 661, 680 and 706 inverse cm adapted for a He-Ne 632 nm laser source. The peak transmission is 1 in every band whereas the background transmision between bands is no more than 0.1. Practical implementation is feasible with commercially available dielectric materials and vacuum deposition technique.

NOTES

Luminescence properties of biological molecules infiltrated in synthetic opal

G. Dovbeshko [1], O. Fesenko [1], V. Boyko [1], V. Romanyuk [2], V. Gorchev [3], S. Karachin [3], V. Moiseyenko [4], V. Gorelik [5]
[1] Institute of Physics of NAS of Ukraine, Ukraine;
[2] Institute for Physics of Semiconductors of NAS of Ukraine, Ukraine
[3] O.V. Palladin Institute of Biochemistry of NAS of Ukraine, Ukraine
[4] Dnipropetrovsk National University, Ukraine
[5] P.N. Lebedev Physical Institute of RAS, Russia

Photonic crystals (PC) are of great interest in device applications for optics, optoelectronics, sensors due to their potential in control of light emission and propagation. Forbidden and stop zones for light propagation are one of the characteristic features of PC that drastically affects the optical properties of PC as well as molecules inserted in the PC cavities. We have studied the opals infiltrated by DNA (deoxyribonucleic acid), poly-A (polyadenylic acid) and Glycine [1, 2]. Nanodispersive silica globules (with particles size near 240 nm in diameter) were synthesized by the method of Stober. PC was obtained by conventional sedimentation. For registration of spectra of luminescence and visualisation of biological molecules we applied LS-55 Fluorescence Spectrometer (PerkinElmer) and.confocal microscopy LCM 510 (Carl Zeiss, Germany) microscope. Enhancement of luminescence of DNA infiltrated in opal seems to be connected with coincidence the energy levels in DNA and SiO_2, transition and/or conversion energy. Visualization of biological molecules on the surface PC is probably due the same fact. Acknowledgment: we thank Ukrainian-Russian project and STCU #5525 for financial support.

1.V. Boyko, G. Dovbeshko, O. Fesenko, V. Gorelik, V. Moiseyenko, V. Romanyuk, T. Shvets, P. Vodolazkyy. MCLC. – 2011. V. 535. P.30.
2. G.I.Dovbeshko, O.M.Fesenko, V.V.Boyko, V.R.Romanyuk, V.S.Gorelik, V.N.Moiseyenko, V.B.Sobolev, V.V. Shvalagin. Secondary emission from synthetic opal infiltrated by colloidal gold and glycine. UJP – 2012. V. 57, №2. P.154.

NOTES