

## Nanocomposites and nanomaterials

### Spectral and nonlinear optical properties of mono- and multilayer films based on star-shaped nanoparticles, planted on the glass substrate.

M.S. Brodyn <sup>1</sup>, V.I. Rudenko <sup>1</sup>, V.R. Liakhovetskyi <sup>1</sup>,  
T.G. Beynik <sup>2</sup>, N.A. Matveevskaya <sup>2</sup>

<sup>1</sup> Institute of Physics of NAS of Ukraine. Prospect Nauki, 46, Kiev-03039, Ukraine.  
E-mail: lyakh@iop.kiev.ua

<sup>2</sup> Institute for Single Crystals of NAS of Ukraine, Prospect Nauki, 60, Kharkiv- 61001, Ukraine.

The present work reports about our investigations of spectral and nonlinear optical properties of mono- and multilayer films based on gold multibeam nanostars. For creation of gold nanostars the silver ions was attached to the gold nanospheres. They attached to the planes with the biggest surface energy  $\{110\}$ ,  $\{100\}$ ,  $\{310\}$  and  $\{720\}$  [1] and stopped the growth of gold at this plains. The growth of gold going at the plain  $\{111\}$  with small surface energy. As a result the gold offset are formed. (Fig.1) We have shown that the spectral position of maximum of surface plasmon resonance varies in the range of 530 - 570 nm depending on the number of cycles of films creation. Nonlinear cubic optical susceptibility of this films was investigated by z-scan technique. The relatively high value of optical cubic susceptibility, indicates the perspective of using such structures in modern optoelectronics devices.

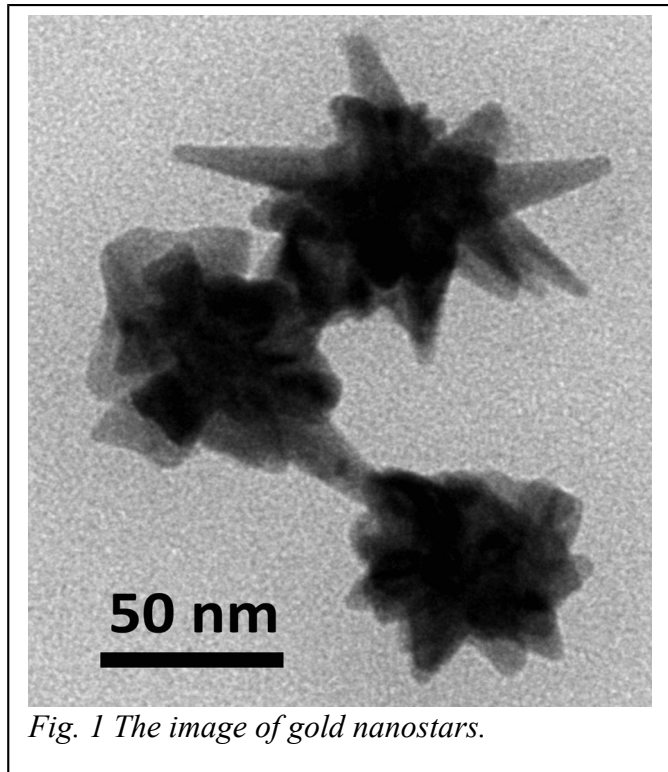


Fig. 1 The image of gold nanostars.

I. Ndokoye P., Li X., Zhao Q., Li T., Tade M.O., Liu S. Gold nanostars: Benzyltrimethylammonium chloride-assisted synthesis, plasmon tuning, SERS and catalytic activity // Journal of Colloid and Interface Science.-2016. -462, N 2. -P.341-350 .