Zhukova L V et al., J Nanomed Nanotechnol 2014, 5:5
http://dx.doi.org/10.4172/2157-7439.S1.018

OMICS Group Conferences
Accelerating Scientific Discovery

4th International Conference on
Nanotek & Expo

December 01-03, 2014 DoubleTree by Hilton Hotel San Francisco Airport, USA

Photonic infrared fibers based on nanodefective crystals

Zhukova L V, Korsakov A S, Shmygalev A S and Vrublevsky D S
Ural Federal University, Russia

We demonstrate a new class of photostable, ductile, non-hygroscopic, nanodefective AgBr-TlI- and AgBr-TlBr-TlI-based crystals with widened transparency range and lack of cleavage. Wide range of optical and mechanical properties, as we found out, is affected directly by grain size of the material, which is a breakthrough, since an IR fiber with desired properties can be obtained due to that after certain preliminary simulations. The main feature of new crystals and fibers based on them is their transmission range. The researches shown, that within the spectral range in question, the best transmission is exhibited by the fiber which structure is formed by grains with the average size of 95 nm, composition being $Ag_{0,92}Tl_{0,02}Br_{0,92}I_{0,08}$. We proved that the structure of IR-fibers depended from extrusion regimes and crystal composition. The fiber has a composition of $AgCl_xBr_{1-x}$ and is obtained at the temperature of 170°C and the pressure of 1100 MPa on the 10-millimiter-diameter billet has average size of grain equal 237 nm. The fiber has a composition $Ag_{0,99}Tl_{0,01}Br_{0,99}I_{0,01}$ and $Ag_{0,92}Tl_{0,08}Br_{0,92}I_{0,08}$ extruded at the temperatures of 180°C and 190°C and pressures of 950 and 800 MPa on the billet of the same diameter and have average size of grain equal 115 and 95 nm, respectively. Breaking point was determined for 10- centimeter-long samples with 1.15-milimiter diameter. Fiber was fixed in the wedge-screw claws and experienced the strain, cross-arm movement speed being 20 mm/min and strain being 10 kN. Regularities obtained allow concluding that the decrease in average size of grain leads to the rise of tensile strength of fibers extruded from crystals.

Biography

Zhukova L V is Doctor of technical science and Professor of Department of Physical and Colloidal Chemistry. She has published more than 150 scientific papers and more than 50 copyright certificates and patents of Russian Federation.

l.v.zhukova@urfu.ru