Erbium photoluminescence in opal matrix and porous anodic alumina nanocomposites

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The introduction of Er^{3+} ions in mesoporous matrices/photon crystals of the various nature essentially changes the processes of light interaction with the gain matter, in particular, due to increase the interface contribution of such composites, formation of the photonic band gaps, and also other quantum-dimensional effects. Thus, the spectral structure and luminescence intensity in many respects are defined by conditions of nanocomposites formation.

Self-organizing design methods of photon crystals on the basis of cubic packing nanospheres SiO_2 (opal matrices) and porous anodic alumina (PAA) are considered. The erbium ions are deposited in the matrices by a sol-gel method, and also by their impregnation by nitrates of rare earth elements. The photoluminescence characteristics of nanocomposites being received are investigated depending on element structure, concentration of rare earth ions, matrix composition and optical properties, technology et al. Application opportunities of 3D– (volume) and 2D– (planar) nanocomposites (doped by erbium or others rare earth elements) in systems of transfer, storage and processing of the optical information are discussed.

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