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Features of dye lasing in organic-nonorganic thin films

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For the necessities of the integrated optoelectronics it is extremely necessary creation of light sources of submicron sizes that would be made on the same layer with other optical elements. This possibility is provided by sol-gel technology which allows making hybrid organic-inorganic films with optical parameters that vary depending on their composition and manufacturing technology. These films are an inorganic matrix (of 200 - 300 nm thickness) made from silicon or titanium oxides containing the nanosized pores (about 12 nm diameter) filled by an organic compound with dissolved lasing dye. Due to the pore diameter much less then wavelength thew light propagates in such films without scattering. In combination with possibility to make their refractive index by varying of inorganic component these films are perspective for their application as active media of waveguide lasers.

The studying is shown that both films reveal lasing on quasi waveguide modes, which have radiative losses into the substrate and correspond to radiative mode of substrate. Corresponding radiation, emerging from the end of the film, diverges strongly through diffraction. This emission is accompanied by the emergence of the less diverged lateral beam from the end of substrate which corresponds to radiative mode of substrate. Threshold intensity of the lasing in the more refractive matrix TiO2 appeared one order lower than in SiO2 one. These results demonstrate perspective of studied film a light sources for integrated optoelectronics.

Topics

Session B. Laser physics and modern optoelectronics

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