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Photoluminescent characterization of nanostructured ZnO obtained by electrolysis

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The rapid development of the optoelectronic industry is stimulating the search for new materials and the development of highly efficient emission structures based on them, including nanoscale objects, in particular nanocrystals or nanoparticles. Particular attention is paid to expanding the spectral range of luminescent materials, as well as improving their manufacturability, efficiency, stability.
This work is devoted to the study of the luminescent properties of ZnO nanoparticles depending on different conditions of electrolytic synthesis developed by domestic technologists, and, accordingly, the optimization of synthesis regimes.
Nanosized zinc oxide particles were obtained by electrolysis of Zn in aqueous sodium chloride solution without or with the surfactant. The addition of surfactants to the electrolyte solution leads to much smaller particles and reduces their polydispersity. The samples under study were obtained using different durations of synthesis.
Investigations of the light-emitting properties of the obtained samples were done using two modern facilities. Measurements of photoluminescence at high-power monochromatic excitation (using lasers and laser LEDs) was performed using the MDR-23 spectrometer based set-up on. More detailed studies of luminescence and luminescence excitation was performed using the SHIMADZU RF-1501 spectrofluorimeter, which allows to measure spectra when excited by light in a wider range of wavelengths. The correlation has been found between the presence of blue photoluminescence band and technological parameters of synthesis.

Topics

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