

# Nanocomposites and nanomaterials

## White light emission of ZnO-Cu nano-film.

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The ZnO films were prepared by reactive rf-magnetron sputtering of zinc targets [1] onto different types of substrates. For Cu-doping of the ZnO films, the close space sublimation method (CSS) was used at atmospheric pressure in air at temperatures of 500°C and of 570°C. After CSS processing, the undoped ZnO and ZnO-Cu films were annealed at temperature of 600°C in a wet media for 1 hour. The reference ZnO-Cu films, obtained from ZnO-Cu target, were treated at the same conditions.

XRD results indicated that all the ZnO films have a polycrystalline hexagonal structure. The average nanocrystals size is varied from 14 nm for ZnO/Al<sub>2</sub>O<sub>3</sub> to 30 nm for ZnO/Si. Presented samples have different defects that are generated at the growth or treatment, and it is reflected in the visible (VIS) defect-related PL spectra. The effect of Cu doping was an obvious and identical for all the films, namely the intensity of UV band decreased and the intensity of VIS band of PL spectra increased. However, the shape of the spectrum depends on the method of doping. Spectrum of the reference ZnO-Cu films has green band only.

Spectrum of ZnO-Cu films, doped by CSS, consists of three emission bands. The first band is in a blue region with a maximum at 460 nm. The second and third bands are in the green and orange regions with maximum at 525 and 595 nm, respectively. The green band is the most intensive. As a consequence, the emission looks like white light Origin of observed emission bands is discussed.

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1. *Khomchenko V. S., Sopinskii N. V., Savin A. K., Litvin O. S., Zayats N. S., Khachatryan V. B., Korchevoi A. A.* Deposition of carbon films using close space sublimation // *Technical Physics.*–2008.–**53**, N 6. – P.757-762.