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XVI МІЖНАРОДНА КОНФЕРЕНЦІЯ З ФІЗИКИ І ТЕХНОЛОГІЇ
ТОНКИХ ПЛІВОК ТА НАНОСИСТЕМ

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(dedicated to memory Professor Dmytro Freik)

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Structural Properties of CdS:Dy Films Obtained by Close-Spaced Vacuum Sublimation

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Cadmium sulfide (CdS) is a well-known II-VI chalcogenide semiconductor compound with *n*-type conductivity. CdS is one of the most perspective materials for the optoelectronic devices and thin-film solar cells. The recent investigations show that the appropriate doping by the rare earth elements leads to the improvements of the properties of the window layers. Such impurities create the deep-level emission centers inside II-VI compounds, resulted in the optical conversion of the solar irradiance with the lowered frequency, which in turn can increase the efficiency of solar cells. However, there is a lack of the works devoted to the study of CdS thin films doped by the rare earth elements.

In this paper we investigated the effect of the substrate temperature on the structural properties of CdS:Dy thin films.

The thin films were deposited by the close-spaced vacuum sublimation (CSVS) method onto the cleaned glass substrates using the VUP-5M equipment. Samples were deposited on the cleaned glass substrates. The evaporator temperature was $T_e = 1173$ K, the substrate temperature was varied in the range of $T_s = 573-773$ K. The condensation time was $t = 4$ min. X-ray diffractometer DRON 4-07 in Ni-filtered K_α radiation of cobalt anode ($U = 30$ kV, $I = 20$ mA) was used to study the structural properties. The measurements were carried out in the range of 2θ angles from 25° to 95° , where 2θ – Bragg's angle. The obtained curves were normalized to (002) peak intensity of the hexagonal phase. The phase analysis was performed by comparing the interplane distances and relative intensities of the obtained samples with the data according to JCPDS standards. A detailed description and scheme of the device for deposition of the thin films, and the methodology of the studying of the structural properties are available in [1].

As the result of the investigations, it was established that CdS thin films had the hexagonal structure with [002] growth texture for the samples with different condensation temperatures. It was determined the substrate temperature effect on the lattice constants, coherent scattering domain sizes, microstrains, and other structural parameters of the material.

1. Substrate-temperature effect on the microstructural and optical properties of ZnS films obtained by close-spaced vacuum sublimation / D. Kurbatov, A. Opanasyuk, H. Khlyap [et al.] // *Phys. Status Solidi*. – 2009. – № 7. – P. 1549–1557