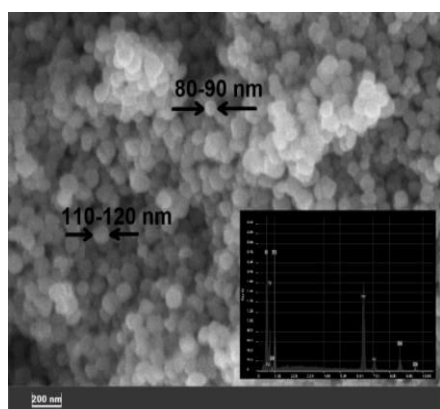


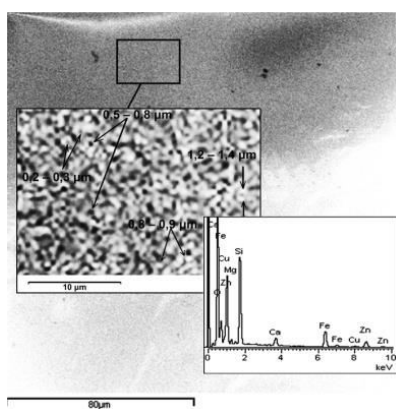
# MORPHOLOGY AND OPTICAL PROPERTIES OF ZnFe<sub>2</sub>O<sub>4</sub> THIN FILMS GROWN BY RF-MAGNETRON SPUTTERING

T. D. Gutsul<sup>1,\*</sup>, S. N. Zavrainii<sup>1</sup>, S. A. Moldovanu<sup>2</sup>, M. C. Lupu<sup>1</sup>, V. M. Fedorov<sup>1</sup>  
<sup>1</sup>Technical University of Moldova, "D.Ghitu" Institute of Electronic Engineering and Nanotechnologies, Chişinău, Republic of Moldova  
<sup>2</sup>Institute of Applied Physics, Moldova State University, Chişinău, Republic of Moldova  
\*E-mail: tatiana.gutul@iien.utm.md

Nanocomposite materials based on ferrites have recently become effective heterogeneous catalysts and are widely used in the purification of water systems from organic pollutants [1]. Zinc ferrite occupies a special place as a prospective semiconductor photocatalytic material due to the photoresponse in the visible light spectrum, the band gap is 1,9 eV [2]. Zinc ferrite-based film structures are insufficiently represented, although they have a technological perspective. Thus, the creation of photocatalytic systems based on zinc ferrite is an actual task. In the presented work we obtained ZnFe<sub>2</sub>O<sub>4</sub>/glass film structures using the RF-magnetron sputtering method. The target was made by pressing of zinc ferrite nanoparticles synthesized by us using the solvothermal method. The morphology of ZnFe<sub>2</sub>O<sub>4</sub> nanoparticles and thin films was characterized by Scanning Electron Microscopy (SEM-Philips XL30 SFEG and TESCAN VEGA 5124). Optical characteristics of the obtained ZnFe<sub>2</sub>O<sub>4</sub>/glass films were measured on the Spectrophotometer UV-VIS T-80.

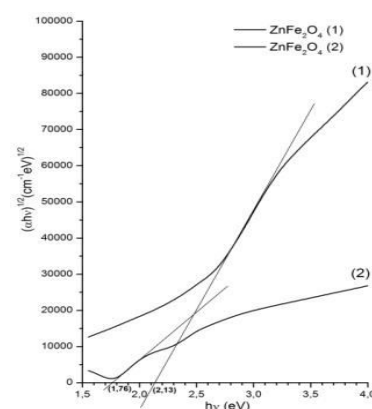


(a)



(b)

**Figure 1.** SEM of ZnFe<sub>2</sub>O<sub>4</sub> NPs (a) and SEM EDX of ZnFe<sub>2</sub>O<sub>4</sub>/glass thin film (b).



**Figure 2.** Tauc's plot analysis of UV-Vis absorption spectra of (αhv)<sup>1/2</sup> (cm<sup>-1</sup>eV)<sup>1/2</sup> versus photon energy hv(eV) of ZnFe<sub>2</sub>O<sub>4</sub>/glass structures.

The morphology and sizes of ZnFe<sub>2</sub>O<sub>4</sub> nanoparticles are shown in Fig.1(a). Nanoparticles have a spherical form with dimensions from 5 to 10 nm. Because of nanoparticles high surface energy, they undergo rapid interparticle interaction and enlarge into spheres with a diameter from 80 to 120 nm. Film structures of ZnFe<sub>2</sub>O<sub>4</sub> are flexible chain formations consisting of spherical nanoparticles with dimensions from 150 to 250 nm. In Fig.2 the data of spectrophotometric studies for ZnFe<sub>2</sub>O<sub>4</sub>/glass samples with a band gap of 1,76 eV and 2,13 eV are presented.

[1] S. K. Sharma. Spinel Nanoferrites. Springer 2022, 315.

[2] C. Zhang, X. Han, F. Wang, L. Wang, J. Liang. Frontiers in Chemistry 2021 9 Art.736369.