Some remarks on the paper “Influence of zinc concentration on band gap and sub-band gap absorption on ZnO nanocrystalline thin films sol-gel grown” by Munirah, Ziaul Raza Khan, Anver Aziz, Mohd. Shahid Khan, M.U. Khandaker [Mater. Sci-Poland, 35 (1) 2017, 246 – 253]

PAWEŁ E. TOMASZEWSKI*

Institute of Low Temperature and Structure Research, Polish Academy of Sciences, P. No. 1410, 50-950 Wrocław 2, Poland

Keywords: ZnO; X-ray diffraction; mistakes

The commented paper [1] presents the results on structural, morphological and optical studies on the nanocrystalline thin films of ZnO. Unfortunately, there are some mistakes in the crystallographic part of this paper which should be corrected to avoid their use in the future papers by Authors and other people.

In general, the X-ray diffraction peak of the highest intensity is a result of a specific structure of crystal and could not correspond to the preferred orientation in the corresponding direction. This may be also a result of the specific experimental conditions. The pattern with only one high peak indicates on the single-crystalline character of the film and specific position of the sample with respect to X-ray beam. Such specific orientation allows the diffraction from only one plane as in the case of thin films with well oriented films or grains.

However, the diffraction patterns shown in Fig. 3 of the commented paper indicate on the strange effect described by only two peaks arising from the diffraction on totally different and mutually perpendicular crystal planes. This effect can be explained by two different possibilities of the crystallites arrangement within the sample. First case is the existing of two sets of crystallites with different

orientations: one with the crystallites aligned along [1 0 0] direction, and second one: along [0 0 2] direction. The second possible explanation assumes that the film is composed of two layers with different preferred orientations of crystallites. Such two-layer film may be created during the film growth. In both cases, this is an evidence of poor quality of the samples due to their inhomogeneity. The mutual composition may be estimated from the ratio of the intensities of both diffraction peaks. In any other cases, all diffraction peaks should appear on the diffraction pattern.

The sample made from the zinc acetate with molar concentration of 0.35 M is the best one. Other samples have a high amount of the amorphous phase manifested by the hump at 2θ of about 18° . This may be also from the amorphous substrate of the samples but any explanation of this property of the studied samples was not presented by Authors. In both cases, the subsequent studies might be strongly affected by this part of sample leading to the results with a small scientific value.

Unfortunately, the scientific terminology is used incorrectly in some cases. For example: “peak intensity along the (1 0 0) plane” instead of correct “from the plane”, “crystal orientation have changed with (...) concentration” – should be: crystallite orientation.

*E-mail: petomasz1@wp.pl;
ORCID iD: 0000-0002-6688-7762

In conclusion, the commented paper has a limited scientific value in its crystallographic part.

References

- [1] MUNIRAH, ZIAUL RAZA KHAN, ANVER AZIZ, MOHD. SHAHID KHAN, M.U. KHANDAKER, *Mater. Sci.-Poland*, 35 (2017), 246.

Received 2018-05-12

Accepted 2018-11-13