Comments on “Structural, Optical, and Electrical Properties of Zn-Doped CdO Thin Films Fabricated by a Simplified Spray Pyrolysis Technique” by K. Usharani and A.R. Balu Published in Acta Metall. Sin. (Engl. Lett.) 28(1), 64–71 (2015)

Paweł E. Tomaszewski¹

Received: 9 April 2018 / Published online: 21 June 2018
© The Chinese Society for Metals and Springer-Verlag GmbH Germany, part of Springer Nature 2018

The commented paper [1] presents the results on structural, optical, and electrical properties of Zn-doped CdO thin films. Unfortunately, there are several mistakes and errors not found by any of referees. It is necessary to show these mistakes or misleading statements to avoid their use in the future papers by authors and other peoples.

1. The formula for micro-strain evaluation, (3), is wrong. It should be “ $\cot\theta$ ” instead “ $\cos\theta$ ” ($\cot\theta = \cos\theta/\sin\theta$). Unfortunately, this error is rather popular in other papers. This is a formula by Wilson for the broadening of diffraction profile due to micro-strain within the sample. As a result all data on the micro-strain presented in Table 2 are wrong.
2. The X-ray diffraction peak of the highest intensity does not point out on the preferred orientation in the corresponding direction. In most of cases its intensity is only related to the crystal structure of studied crystal, no more. This is the case of CdO (Fig. 1) where the intensities of Bragg peaks agree well with the powder diffraction pattern of crystal. That is why all cited papers have the same result. Thus, there are no preferential orientation along [111] direction!
3. The change of f factor may be due to the change in crystal structure and not to “reorientation effect”.

4. The crystallite size in Table 2 should be presented without decimal digits. The systematic errors for evaluation of crystallite size from Scherrer formula are so high that so precise values are out of scientific meaning [2, 3]. More, the Scherrer formula should NOT be used for quantitative crystallite size analysis. Moreover, the use of Scherrer method is not correct (although popular) due to several parameters of such calculations which should be taken into account, e.g. type of correction for instrumental broadening of diffraction lines, type of profile fitting, etc. [2, 3]. Without such information the obtained values are of limited meaning.

References

- [1] K. Usharani, A.R. Balu, Acta Metall. Sin. (Engl. Lett.) **28**(1), 64 (2015)
- [2] P.E. Tomaszewski, Phase Transit. **86**, 260 (2013). <https://doi.org/10.1080/01411594.2012.715301>
- [3] P.E. Tomaszewski, Wiad. Chem. **67**, 929 (2013)

Available online at <http://link.springer.com/journal/40195>

✉ Paweł E. Tomaszewski
petomasz1@wp.pl

¹ Institute of Low Temperature and Structure Research, Polish Academy of Science, P. Nr 1410, 50-950 Wrocław 2, Poland