

Review

of the Ph.D. Thesis of Thaiskang Jamatia

entitled:

Preparation and characterisation of fillers for polymer nanocomposite layers usable in electronics

The thesis deals with experimental results of microwave-assisted polyol synthesis of undoped and Fe and Al doped ZnO nanoparticles from zinc acetate precursor diethylene glycol solution. Doping of ZnO nanoparticles allowed modification of its optical and electronic properties. Reduction of Fe^{3+} to Fe^{2+} provided p-doping resulting in decreased UV luminescence while addition of Al^{3+} resulted in n-doping of host nanoparticles with enhanced UV luminescent intensity. The use of long-chain organic ligand during synthesis provided product with less agglomeration and ZnO nanoparticles could be finely dispersed in toluene what is important in preparation of nanocomposites.

Furthermore, polymer light-emitting diodes were prepared by spin-casting and positive role of synthesized nanoparticles in chromaticity characteristics and tuning of electroluminescence intensity.

The thesis structure follows the template used at Faculty of Technology. After brief Introduction chapter Aims of the Thesis are presented followed by Experimental methods, Results and Discussion. Based on results discussion relevant conclusions are formulated together with contribution of research work to science and practice. Ongoing research and future prospect is mentioned as well. The author used 172 references, many of them very recent because progress in this research area is very rapid. Careful preparation is evident, very good English and minimum typing errors can be found. Some of the results were already published in scientific journals included in Web of Science database or at international conferences, some are in form of manuscript.

Student had to handle with results of variety of sophisticated techniques such as electron microscopy, X-ray diffraction, UV-VIS spectroscopy, FTIR, fluorescence spectroscopy, dynamic light scattering, TGA/DSC, profilometry and also with devices used for sample preparation such as microwave reactor and spin coater. It would be good to include in presentation personal contribution of student to individual publications.

In order to stimulate discussion of results during defence I prepared a few questions:

- 1) How can be influenced particle size and particle size distribution during MW synthesis?
- 2) What life time of prepared LED can be expected?
- 3) What benefit can bring In- and Ga- doping of ZnO?

The comments and questions introduced above do not diminish the quality of scientific level of Thaiskang Jamatia and his contribution to the field of Technology of Macromolecular Compounds. Therefore, I recommend accept this Thesis and after successful defence to award Thaiskang Jamatia Philosophiae Doctor (Ph.D.).

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Assoc. Prof. Vladimír Pavlínek