

Supervisor's opinion on the PhD. thesis

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

by

Thaiskang Jamatia

submitted to the

Tomas Bata University in Zlin

Thaiskang Jamatia, MSc., studied in the Study course ‘Technology of Macromolecular Compounds’ in the Ph.D. programme ‘Chemistry and materials technology’ at the Centre of Polymer Systems, Tomas Bata University in Zlín, Czech Republic. Within his studies, he has fulfilled all duties connected with the study programme and successfully passed the state exam in 2019. His dissertation work was focused on the synthesis of semiconductor nanoparticles for polymer nanocomposite thin layers applicable in polymer electronics. His specific aim was to develop a microwave-assisted synthesis of ZnO nanoparticles and study effects of doping the ZnO by iron and aluminium. Firstly, he had to optimise the preparation of undoped ZnO nanoparticles. Therefore, he studied the role of water, capping agent (oleic acid) and ZnO precursor molar concentration in the reaction mixture. Then he introduced the dopants. While aluminium doping works as predicted according to its p-block element character, the oxidation state (and, hence, the doping type) of iron had to be revealed because it is a d-block element and its behaviour depends on the way of the material preparation. All obtained nanoparticles were characterised by several spectroscopic methods, electron microscopy and XRD. The intention of this part of the research was to modify the size and bandgap of the particles in such a way that it can be added to the thin polymer emissive (or active, in other words) layer in polymer light-emitting diode (PLED) and find suitable nanoparticle parameters so that the device can reach high luminance. Therefore, Thaiskang Jamatia had to demonstrate the effect of the particles in the prepared device. This work was performed hand by hand with another dissertation of Ing. Jakub Ševčík, Ph.D. who was focused on the preparation of the PLEDs and analysis of their electrical properties. In contrast to that, Thaiskang demonstrated prepared PLEDs as sources of light and correlated the properties of the fillers not only with the intensity but also with the chromaticity of emitted light.

Thaiskang is a useful member of our group. The abilities and readiness of Thaiskang to start an independent career of a researcher are documented by the list of his publications and active presentations on international conferences. He has experience from several research projects. During his study and work at the TBU in Zlin, Thaiskang Jamatia, MSc., has already demonstrated sufficient diligence, knowledge and effort necessary for successful accomplishment of doctoral study in the PhD. Programme.

Concerning these facts and according to my opinion, I recommend the Thesis for defence and upon successful presentation of his dissertation, and all further necessary considerations by the committee, to award Mr Jamatia the degree Doctor of Philosophy (Ph.D.).

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Assoc. Prof. Ing. et Ing. Ivo Kuřitka, Ph.D. et Ph.D.

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