

Supervisor's opinion on the Ph.D. thesis

**„Hydrogel-based bioactive food packaging material for agro products“**

by

**Smarak Bandyopadhyay**

submitted to the

**Tomas Bata University in Zlin**

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Smarak Bandyopadhyay, M.Sc. studied the study degree course „Technology of Macromolecular Compounds“ within the degree programme „Chemistry and materials Technology„ at the Faculty of technology and at the University Institute, Centre of Polymer Systems.

Within his studies, he has fulfilled all duties connected with the study programme and successfully passed the state exam on November 28, 2019.

His dissertation thesis is focused on the production of bacterial cellulose from waste apple juice and utilizing the bacterial cellulose to develop novel biodegradable hydrogel film compositions. During the study he gradually optimized the composition so that he achieved suitable parameters for a new type of functional food packaging materials. His proposed food packaging is based on PVC-CMC-BC-GG composition with essential oils and anthocyanin. This solution thus meets the basic conditions for future food packaging policy in the EU by being biodegradable, able to enhance the shelf life of the food and having sufficient additional physical properties. He achieved interesting results in the field of bio-degradation, where his packaging designed films was 80% degraded in compost bed in 30 days and complete degradation in 60 days. Further, the incorporation of anthocyanin has made the packaging materials PH-sensitive and therefore successful in detecting PH changes due to food spoilage. To improve the antimicrobial properties he used essential oils.

Smarak Bandyopadhyay was an active and useful member of the Biocomposite systems research group led by Assoc. Professor Nabanita Saha, who was his consultant.

In his work he used the experience gained from previous work at the Bangalore University and Ramakrishna Mission Vivekananda University, both in India.

During his studies he demonstrated the ability to independently solve demanding experimental tasks, the ability to creatively solve problems and ability to properly evaluate outputs.

The results of his activities during his studies in Zlin can be found in the Web of Sciences in 6 records. His works have been cited on Web of Science 18 times so far. He presented his results at 2 conferences ( PPS-35 in Turkey and Novel Trends in Rheology VII in Zlin).

With regard to these facts I can recommend his Thesis to be defended and upon his successful defence recommend him to be awarded the degree Doctor of Philosophy ( Ph.D.).

Professor Petr Saha

Supervisor

