

## The PhD student's Supervisor's Opinion of PhD Thesis:

The dissertation PhD thesis entitled “**Study on Calcium Reinforced Polymeric Hydrogel Scaffolds for Bone Tissue Regeneration**” is prepared by **Mr. Probal Basu, M.Sc.** under supervision of me and consultation of prof. Ing. Petr Sáva, CSc. He joined in doctoral study in September 2016 and accomplished his doctoral study at Faculty of Technology, Tomas Bata University in Zlin, Czech Republic under the degree course: *Technology of Macromolecular compounds* and degree program: *Chemistry and Material Technology*.

In this PhD thesis work, focus has been given mainly for the development of novel calcium filled hydrogel scaffolds using a combination of natural polymer i.e. bacterial cellulose (BC) and other synthetic polymers like polyvinylpyrrolidone (PVP), polyethylene glycol (PEG). The scaffolds were prepared in two forms. *First*, calcium phosphate (CaP) reinforced BC based hydrogel scaffolds were prepared, where CaP was used in the form of  $\beta$ -tri calcium phosphate ( $\beta$ -TCP) and hydroxyapatite (HA) in different concentrations. *Second*, calcium phosphate & calcium carbonate reinforced BC based hydrogel scaffolds were prepared through template mediated in vitro biomineralization of CaP. After development of any new material, as it is important to investigate its *structural properties* as well as *functional properties*, the said doctoral thesis of Probal Basu has been fulfilled those information carefully prior to select/recommend the best scaffold composition and properties for its application in bone tissue regeneration. Finally, the calcium phosphate reinforced bacterial cellulose based hydrogel scaffolds designated as BC-PVP- $\beta$ -TCP/HA\_20:80 and BC-PVP- $\beta$ -TCP/HA\_50:50 are recommended for further analysis (e.g. in vivo study) and application in soft bone tissue especially for cancellous bone regeneration.

Moreover, it is interesting to mentioned that Mr. Probal Basu *established his skill* in planning of work and experimental design with scientific justification throughout his doctoral study period (September 2016 - August 2020), *published scientific articles* in international journals (Jimp), *presented his research achievements* in several international platforms (conferences and seminars) also *attended workshop and symposium* related to his research topic supported by e-COST Action including Internal Grant Agency of Tomas Bata University in Zlin, Czech Republic.

He is a responsive as well as hard working person with scientific understanding, has keen interest in research activities, able to write scientific article independently, has sharing attitude with co-researcher. I wish after completing all the formalities of his doctoral study, he could be a future individual researcher in the field of polymer/material technology for biomedical applications. Mr. Probal Basu fulfilled all the criteria of doctoral thesis preparation and submission. **I am pleased to recommend him to submit his PhD thesis for further necessary action.**



(Nabanita Saha)

Date: 14.08.2020; Place: Zlin