Fabrication of electrospun biofiber for biomedical applications

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Polyhydroxybutyrate (PHB) is a natural biopolymer synthesized by natural occurring microorganisms. In a natural environment, different bacterium such as purple non-sulfur bacteria (PNSB) can accumulate PHB as a carbon storage molecule under stress or nutrient limiting conditions. PHB polymer is alternative to conventional petroleum-based plastics and it can be used in the medical fields like tissue regeneration and wound healing due its biocompatibility and biodegradability properties. In this study, PHB extracted from various PNSB namely *Cereibacter sphaeroides*, *Rhodobacter capsulatus* and *Rhodopseudomonas palustris* was used to fabricate electrospun PHB/collagen biofibers to be used for wound healing and tissue regeneration. The bacterial strains were cultured under aerobic conditions with nitrogen supplied in scarce amounts, and the fermentation process was maintained at 30°C in shaker at 150 rpm. The solvent extraction method was utilized for recovery of intracellular PHB because it is simple, effective, fast, and produces high purity PHB. It was found that the PHB content of the bacteria was up to 11% (w/w). The extracted PHB was characterized by H-NMR and FTIR. Then, dried PHB was mixed with commercial collagen 1 to produce fibers by electrospinning. The PHB/collagen fibers were then developed using electrospinning and examined using field emission scanning electron microscopy (FE-SEM) to capture the nanofiber images. To conclude, the PHB/collagen fibers were successfully fabricated to be used in medical applications such as wound healing and tissue regeneration. The authors gratefully acknowledge the support of the REGENEU project (no:101079123) funded by Horizon Europe.