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学位の種類	博士（　工学　）
学位記番号	甲　第７０３号
学位授与の日付	平成３１年３月２０日
学位授与の要件	信州大学学位規程第５条第１項該当
学位論文題目	Fabrication of nanofibers composites for biomedical and textile applications （生物医学および繊維応用のためのナノファイバー複合材料の製造）
論文審査委員	主査　教　授　金　翼水 教　授　後藤　康夫 教　授　森川　英明 准教授　金　慶孝 准教授　Mayakrishnan Gopiraman（建国大学）

論　文　内　容　の　要　旨

The nanofibers has become very interesting topic for the researchers due to its applications ground, and it is being used in various research fields such as biotechnology, biomedical, electrical & electronics, environmental and energy resources due to its advanced properties and high potentials applications. Therefore, this thesis covered the series of experiments related to biomedical applications and functional textiles. For this purpose, we started to the formation of blended nanofibers by incorporating natural biomaterials with the synthetic polymer which has a great interest in recent years. We reported the successful fabrication of novel nanofibers using naturally occurring antimicrobial honey incorporated in Poly (1, 4 cyclohexane dimethylene isosorbide trephthalate) (PICT) for the potential wound dressing applications. On the basis of characterizations results, it was concluded that PICT/honey nanofibers containing 15% of honey are more suitable for good elastic behavior and tensile strength as compared to other concentrations of honey used in the polymer solution and in the study of “Preparation and Characterizations of Multifunctional PVA/ZnO Nanofibers Composite membranes for Surgical Gown Application” authors developed the multifunctional; antibacterial, ultraviolet rays (UV) protected and self-cleaning surgical gown by blending of zinc oxide (ZnO) nanoparticles with poly vinyl alcohol (PVA). On the behalf of characterization results, PVA/ZnO nanofibers were exhibited the desired objectives for the surgical gown. This multifunctional surgical gown is beneficial for medical surgeon against the bacteria, stains, and UV blocking to save his/her life.

The fabrication of an artificial blood vessel remains an ongoing challenge for cardiovascular tissue engineering. Full biocompatibility, proper physiological and immediate availability have emerged as central issues. To address these issues, the dual network composite scaffolds were fabricated by coating

the electrospun nanofibres based tubes with PVA hydrogel, which could increase the cell viability and show the potential for controlling the composition, structure and mechanical properties of scaffolds. The authors also tried to form a model for axon, where nanofibers based tubes as scaffolds for potential neuroscience application in the axon were fabricated by Polyvinylpyrrolidone incorporated with gold nanoparticle (PVP/Au) in five different diameters via electrospinning. So the nanofibers based tubes having diameter 0.2 mm made from PVP/Au is the better substrate for farther in vivo or in vitro investigation which will make this material more useful for tissue engineering.

Metals and their nanoparticles, sodium alginate, honey and bacterial cellulose were widely used in the fabrication of scaffolds and wound dressings due to their biocompatibility, but silver sulfadiazine (SSD) is a leading topical antibacterial agent especially for the treatment of burn wound infections. In this novel research study, first time SSD was embedded with nanofibers. The objective of this study was to fabricate high profiled antibacterial properties with lowest toxicity and high cell adhesion. The resultant CA/SSD nanofibers exhibited the appreciable antimicrobial activity against Gram-negative Escherichia Coli and Gram-positive Bacillus Subtilis bacteria with considerable sustainability for repetitive use. In another study, for functional textiles related to biomedical field, were focused. Herein, a self-cleaning effect of electrospun poly (1,4-cyclohexanedimethylene isosorbide terephthalate) nanofibers embedded with ZnO nanoparticles and comparative study of self-cleaning properties of electrospun PVA/TiO2 and PVA/ZnO Nanofibers Composite were examined. On the base of the characterization results, it was concluded that these PVA/ZnO & PVA/TiO2 nanofibers have self cleaning properties, but PVA/ZnO nanofibers have higher self-cleaning properties than PVA/TiO2 nanofibers because PVA/ZnO nanofibers have 95% self-cleaning properties, which is higher than PVA/TiO2 nanofibers.