frontiers | Frontiers in Materials

EDITORIAL
published: 17 June 2022
doi: 10.3389/fmats.2022.955994

Editorial: Electrospinning Based Functional Scaffolds for Biomedical Applications

Mahesh Kumar Joshi[1], Hem Raj Pant[2]* and Arjun Prasad Tiwari[3]**

[1]Central Department of Chemistry, Tribhuvan University, Kirtipur, Nepal, [2]Nanomaterials Lab, Department of Applied Sciences and Chemical Engineering, Institute of Engineering, Tribhuvan University, Pulchowk Campus, Lalitpur, Nepal, [3]Department of Mechanical Engineering and Engineering Science, University of North Carolina at Charlotte, Charlotte, NC, United States

Keywords: electrospinning, biomedical electrospinning, nanofibers, biomaterial scaffolds, gelatin

OPEN ACCESS

Edited and reviewed by:
Hasan Uludag,
University of Alberta, Canada

****Correspondence:***
Mahesh Kumar Joshi
mahesh.joshi@trc.tu.edu.np
Hem Raj Pant
hempant@ioe.edu.np
Arjun Prasad Tiwari
tiwariarjuna@gmail.com

Specialty section:
This article was submitted to Biomaterials, a section of the journal Frontiers in Materials

Received: *29 May 2022*
Accepted: *30 May 2022*
Published: *17 June 2022*

Citation:
Joshi MK, Pant HR and Tiwari AP (2022) Editorial: Electrospinning Based Functional Scaffolds for Biomedical Applications. Front. Mater. 9:955994. doi: 10.3389/fmats.2022.955994

Editorial on the Research Topic

Electrospinning Based Functional Scaffolds for Biomedical Applications

Electrospinning has been emerged as a versatile nanotechnology to produce a variety of nanofiber materials for applications in diverse fields. The notable applications include in sensing, environmental remediation, energy storage, electronic and photonic devices, bioelectronics, wound healing, tissue engineering, drug delivery, enzyme mobilization and many more. The fibers ranging from tens of nanometer to micrometer scale are fabricated by the application of strong electric field on polymer solution or melt. The electrospinning process have many advantages over other nanofiber fabrication technique such low cost, ease of controlling the nanofiber diameter, tunable porosity, ability to manipulate composition of nanofiber, controlling the alignment of nanofiber, incorporating drug or signaling molecules, modifying nanofibrous mesh by post electrospinning process, producing in industrial scale. The nonoven nanoscale fiber mesh generated by this technique have a high surface area to volume ratio, tunable mechanical properties, flexibility, and resembles to the extracellular matrix, the acellular part which offer cellular attachment, proliferation, and migration. Therefore, electrospinning fibers have been regarded as promising in the development of materials for myriad biomedical applications. Moreover, these are considered as not only a simple two-dimensional substrate for limited applications but also expanded as a three-dimensional scaffolds such as stent materials (Obiweluozor. et al.) and functional biomaterials (Tiwari. et al.). This Research Topic collected articles about the latest development of electrospinning technology and expanded uses of its products.

Four articles were collected on this Research Topic. In the first article, Barazesh et al. fabricated the tissue engineering construct using the biopolymers gelation and cellulose acetate. The effect of the cellulose acetate as a reinforcement material in the gelatin matrix was studied in terms of mechanical properties. They have shown enhanced mechanical properties by altering the input variables such as concentration of polymers, weight ratio, collector speed, etc. Similar Sun et al. in another article showed an innovative strategy for endothelial remodeling of tissue-engineered vascular graft fabricated by chiral hybrid electrospinning scaffolds comprised of polycaprolactone and D-phenylalanine and provided new insight into the treatment of cardiovascular diseases. The polycaprolactone and D-phenylamine scaffolds have shown superior endothelial cell adhesion, proliferation, and upregulated expression of extracellular proteins fibronectin-1 and vinculin compared to the polycaprolactone and L-phenylamine scaffolds suggesting the chirality holds a key role in the development of endovascular scaffolds. He et al. has reported fibers with maximal wrinkles using bubble electrospinning and emphasized the synthesis of non-smooth fibers. In another study, Mani et al. showed grapefruit oil and cobalt nitrate loaded polyurethane hybrid nanofibrous scaffolds which were found to have higher blood compatibility as indicated by prolonged clotting time compared to the pristine polyurethane electrospinning materials.

Overall, the Research Topic advances the understanding of electrospinning fibers and their uses in biomedical applications. Further, the experienced, young, and active Research Topic editors' immense efforts can make a truly successful Research Topic of research articles from seven countries.

AUTHOR CONTRIBUTIONS

All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

ACKNOWLEDGMENTS

The editors would like to thank all the authors that contributed to the Research Topic.

Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.