

# Characterization of Forcespun Polycaprolactone Fibers Infused with Bio-Based Hydroxyapatite for Biomedical Applications †

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**Abstract:** A novel Force spinning technique was used to fabricate microfibers from polycaprolactone (PCL) infused with bio-based hydroxyapatite (HA). The aim of this study is to analyze the thermo-mechanical properties of the developed fibers in addition to cell adhesion and proliferation analysis. The HA is synthesized from sundried raw fish scales of carpa family. The fish scales are calcinated at 800°C in a box furnace and are bead milled for one hour in a nano agitator bead mill for particle size reduction. Thus obtained nanoparticles are characterized using XRD, SEM, and TEM for particle size reduction, crystallinity, and structure. The PCL solution formed by dissolving 16 wt% of PCL in chloroform is magnetically stirred for 3 hrs at 170 rpm. The HA nanoparticles were infused in this solution by 1, 2, and 3 wt% and is stirred in a think mixer under vacuum for 7 mins for uniform dispersion of nanoparticles in the solution. The solution mixture is injected into the spinneret of force spinning apparatus. The PCL/HA fibers were collected at rotational aped 7000 rpm with a spin time of 10mins. The thermo-mechanical properties of the fibers were analyzed using tensile test, DSC, and DMA analyses. The biological assessment of the fibers is done using *in vitro* cell studies of the scaffolds that were cut from the fibers. These scaffolds can be further used for various biomedical applications such as sutures and controlled wound healing.

**Keywords:** hydroxyapatite; force spinning; polymer fibers.

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## Conflicts of Interest

The authors declare no conflict of interest. The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript, or in the decision to publish the results.