

Effects of temperature and concentration of simulated body Fluid on bone apatite formation using electrospun poly(ϵ -caprolactone) fibre substrate

ABSTRACT

A versatile synthetic matrix material for bone regeneration using electrospun fibres was introduced in this study. In this work, the electrospinning parameters were controlled to produce favourable porous fibre substrate that can aid in forming calcium phosphate during an in-vitro biomineralisation process. The fibre substrate underwent two concentrations of simulated body fluid (SBF) to incubate the electrospun poly(ϵ -caprolactone) (PCL) fibre substrate at different temperatures (37 °C and 25 °C) for 7, 14, and 21 incubation days. The resultant substrate exhibited a large pore diameter with approximately 10 μ m and uniform thick layer at about 0.36 ± 0.04 mm. From the SEM analysis, a hexagonal apatite structure was formed. An increase in bone apatite was observed when the SBF concentration increased from 1.0 x to 3.0 x. The EDX analysis showed that by increasing the incubation days to 21, the resultant crystal apatite decreased at body temperature of 37 °C. At room temperature of 25 °C, more crystal apatite was observed under the SEM as the incubation days increased. The current study suggested that the bioactivity of electrospun PCL substrate can be done at body temperatures as well as room temperature