

## **Characterization and optimization of the mechanical properties of electrospun gelatin nanofibrous scaffolds**

### **ABSTRACT**

**Purpose:** Electrospinning is a versatile technique for producing polymeric nanofibers by the application of electrostatic forces. The electrospinnability of polymeric solutions and the properties of electrospun nanofibers can be influenced and tuned by the process parameters. This paper aims to investigate the influence of three key process parameters on the tensile strength of electrospun gelatin nanofibrous scaffold. **Design/methodology/approach:** The experiments were conducted with a custom-built electrospinning system. Design of experiments of the three operating variables, namely, gelatin concentration, applied potential and feed rate, with five levels were investigated. Optimization of the tensile strength of electrospun gelatin scaffold was achieved with the aid of response surface methodology. **Findings:** The resulting second-order mathematical models capable of demonstrating good correlation on the effects of the three identified process parameters with the experimental measured tensile strength, where the highest tensile strength was obtained on gelatin nanofibrous scaffold electrospun at 16 per cent (w/v) gelatin concentration in acetic acid, 19 kV applied potential and 0.31 ml/h feed rate. **Originality/value:** The resulting second-order mathematical models capable of demonstrating good correlation on the effects of the three identified process parameters with the experimental measured tensile strength, where the highest tensile strength was obtained on gelatin nanofibrous scaffold electrospun at 16 per cent (w/v) gelatin concentration in acetic acid, 19 kV applied potential and 0.31 ml/h feed rate.

**Keyword:** Response surface methodology; Electrospinning; Nanofibers; Mechanical properties