ABSTRACT

Poly(L-lactide-co-Ɛ-caprolactone-co-glycolide) 74:15:11 mole % was synthesized via bulk polymerisation using stannous octoate as a catalyst at 125 ^{0}C for 90 hrs. The random terpolymer obtained had average molecular weights of $\overline{M}_n$ = 4.6 x 10^4 and $\overline{M}_w$ = 1.2 x 10^5, a peak melting temperature (T_m) = 148.0 ^{0}C and an initial weight loss temperature (T_d) = 231.2 ^{0}C. The terpolymer was melt spun as a monofilament fibre into an ice-cooled water bath (5-10 ^{0}C). The as-spun fibre obtained was amorphous and very weak. However, when it was annealed at 65 ^{0}C for 48 hrs., crystallisation occurred up to 34.8%. After the as-spun fibre was drawn up to draw ratios (λ) of 5 and 7 at 60, 70 and 80 ^{0}C with drawing rates of 300, 400 and 500% min^{-1}, it was found that its crystallinity increased even further (>40%). Results from the X-ray diffraction experiments indicated that crystal orientation in the fibre increased with draw ratio. Moreover, it was also found that increasing the drawing rate stimulated crystallisation. This effect appeared more clearly when drawing at a lower temperature. From tensile testing, the drawn fibres

showed higher strength than the as-spun fibre by a factor of 6, while the extension at break was 20 times less. The best conditions for drawing were to a draw ratio of $\lambda = 7$ at 70 ^{0}C at a drawing rate of 500% min^{-1}. Fibres drawn under these conditions showed a stress and strain at break equal to 245.7 MPa and 77.4% respectively with an initial modulus of 1475.7 MPa.