

EFFECT OF SPINNING PARAMETERS ON PLA/PPC/CURCUMIN MICROFIBER DIAMETER: AN INVESTIGATION VIA RESPONSE SURFACE METHODOLOGY

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ABSTRACT: The initial phase of this study was to investigate the effect of polypropylene carbonate (PPC) additions in polylactic acid (PLA)/curcumin (Cur) blends. It was observed that the presence of curcumin particulates behaved as a reinforcement filler for PPC additions up to 30 wt%. A specific composition was then invested to find the correlation between the fiber diameter and melt-spinning process parameters using central composite design (CCD), a subset of response surface methodology (RSM). Results showed that the spinning temperature had a greater effect than the spinning speed on the diameter of PLA/PPC/curcumin fiber. The response model indicated a good correlation between experimental and predicted values since the ANOVA analysis demonstrated high *F*-value of model adequacy at 10.34, non-significant lack of fit, precision adequacy of 9.94 and *R*² value of 0.80. Therefore, this model can be used in a future study to establish the processing parameters for controlled fiber production.

ABSTRAK: Fasa awal kajian ini adalah bagi mengkaji kesan penambahan karbonat polipropilin ke dalam campuran asid prolaktik (PLA)/kurkumin (Cur). Didapati kehadiran zarah-zarah kurkumin bertindak sebagai pengisi bantuan pada penambahan PPC sehingga 30 wt%. Komposisi tertentu kemudian dikaji bagi mencari kaitan diameter fiber dan parameter proses putaran-cair menggunakan rekaan komposit utama (CCD), dan subset metodologi gerak-balas permukaan (RSM). Keputusan menunjukkan suhu putaran berpengaruh besar berbanding kelajuan putaran pada diameter fiber PLA/PPC/kurkumin. Model yang bertindak balas ini menunjukkan kaitan yang baik antara eksperimen dan nilai yang dijangka kerana analisis ANOVA menunjukkan nilai-*F* yang tinggi pada 10.34 kecukupan model, tidak-ketara kurang padanan, kecukupan ketepatan pada 9.94 dan nilai *R*² sebanyak 0.80. Oleh itu, model ini boleh digunakan pada kajian akan datang bagi menghasilkan parameter proses pengeluaran fiber kawalan.

KEYWORDS: *poly(lactic acid); curcumin; poly(propylene carbonate); fiber; RSM*