Electrospinning Nanofibres of Pullulan Extracted From Phylloplane Fungus, Aureobasidium Pullulans

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Research

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Abstract

Aureobasidium pullulans isolated from the phylloplane of *Peltophorum* tree, produced pullulan, 24 an extracellular polysaccharide. It was grown on three different carbon sources, sucrose, wheat 25 bran and cotton stalk dust, for maximizing the pullulan yield. *A. pullulans* (67.4 gL⁻¹) had the 26 highest yield followed by *A. pullulans* MTCC 1991 (63.68 gL⁻¹). Pullulan was characterized by 27 X-ray diffractometer (XRD), Brunauer-Emmett-Teller (BET) surface area analyzer, DSC and NMR. 28 Electrospinning of pullulan blended with poly (vinyl alcohol) (PVA) produced bead-less 29 nanofibres. The optimized parameters for electrospinning were 25 kV applied voltage, 0.5 mL/h 30 flow rate, 18% polymer concentration (pullulan + PVA) and 150 mm tip-to-collector distance. 31 The pullulan nanofibre was characterized by SEM, AFM, BET, contact angle measurement, DSC 32 and CIE color space analyzer. A maximum surface area of 183.4 m²/g while the minimum 33 nanofibre diameter (79 ± 19 nm by SEM) was obtained for the electrospun mat of commercial 34 pullulan + 40% PVA. This work signifies the importance of pullulan extracted from an isolate of 35 *Peltophorum* tree for conversion to high surface area nanofibres by electrospinning process.

Full Text

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Figures

Figure 1
 FTIR spectra of Commercial Pullulan (a), Pullulan of *A. pullulans* MTCC 1991 (b) and EPS of OL3 (c)

Figure 2

Microscopic images of *A. pullulans* MTCC 1991 showing septate hyphae diameter of 6.08 μm (a), conidiospore bearing conidia of *A. pullulans* MTCC 1991 observed at 400x magnification (b), Isolate OL3 showing septate hyphae diameter of 2.34 μm (c) and prototunicate asci and blastic conidiogenesis of OL3 observed at 100x magnification (d)

Figure 3

XRD spectra of extracted pullulan from commercial pullulan (a), *A. pullulans* MTCC 1991 (b) and *A. pullulans* (c)

Figure 4

DSC thermograms of Commercial Pullulan (Black) (a), Pullulan of *A. pullulans* MTCC 1991 (Red) (b) and Pullulan of *A. pullulans* (Green) (c)

Figure 5

^1H -NMR spectra [a] of commercial pullulan (i) and extracted pullulan from *A. pullulans* MTCC 1991 (ii) and *A. pullulans* (iii); ^{13}C -NMR spectra [b] of commercial pullulan (i) and extracted pullulan from *A. pullulans* MTCC 1991 (ii) and *A. pullulans* (iii)

AFM 3D images of electrospun nanofibres of Commercial pullulan (a); Commercial PVA (b); Commercial pullulan with 40% Poly vinyl alcohol (PVA) (c); Pullulan extracted from *A. pullulans* MTCC 1991 with 40% PVA (d); Commercial pullulan with 50% PVA (e) and Pullulan extracted from *A. pullulans* with 50% PVA (f) at the scale of 2 μ m

Figure 8

DSC thermogram of electrospun nanofibre mats of commercial pullulan with 40% PVA (a), commercial pullulan with 50% PVA (b), pullulan extracted from *A. pullulans* MTCC 1991 + 40% PVA (c) and pullulan extracted from *A. pullulans* + 50% PVA (d)

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