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Melanin functionalized protein nano-fibers: A bio-inspired platform for drug release

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A recent approach for controlled release of drugs comprises of natural-derived biopolymers since they show superior biodegradable/biocompatible features. In this study, nano-fibers containing natural melanin and amyloid-like Bovine Serum Albumin (mel/BSA) were produced by single-needle electro-spinning to investigate drug release behavior of water soluble model drug, namely ampicillin. Prior to electro-spinning, natural melanin was extracted from cuttlefish ink to prepare electro-spinning solution. 20%, 10% and 5% (w:w) Ampicillin:BSA including nano-fibers were produced under 21 kV, 0.3 ml/h for 4 hours. Nano-fiber formation and morphology for different drug formulations was observed by scanning electron microscope. Fourier transform infrared spectroscopy analysis showed that some compatibility exists between ampicillin and mel/BSA nano-fibers. Moreover, drug release tests were conducted to explain the relationship between the drug release behavior and carrier morphology. For single electrospun nano-fibers, 87% of the loaded drug was released within the 96 hours. Together, these imply that drug release vehicles could be extended to melanin functionalized biopolymer carriers.

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