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Mechanochemical Synthesis of Naloxone-Poly (Lactic Acid) for Drug Delivery

Poly(lactic acid) (PLA) is a biodegradable polymer that is used widely in biomedical applications due to its sustainability and biocompatibility. Naloxone is an opioid antagonist that is efficacious in the emergency treatment of opioid overdoses. However, its effectiveness in overdose reversal is limited by its rapid metabolism and short half-life, which require repeated dosage. We have created a mechanochemical technique that uses a one-step anionic ring-opening polymerization of lactide to create naloxone-linked poly(lactic acid) (NLX-PLA) nanoparticles in order to overcome this limitation. Compared to conventional bulk polymerization, this method afforded more stable nanoparticles and a higher naloxone drug loading. Our research indicates that mechanochemistry can be used to build scalable and green drug delivery systems, which is a feasible approach for treating opioid overdoses.

Topical Area

Soft matter: polymers, and complex fluids

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