Multicompartmental biodegradable polymer microneedles for controlled enzyme release

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Transdermal drug delivery represents an appealing alternative to conventional drug administration systems. The development of dissolvable and biodegradable polymer microneedles has recently attracted huge attention, due to their high patient compliance. Stamp based procedures guaranty high tip resolution and reproducibility, but they generally present some constrains in terms of process time, low system engineering degree, possible contaminations, and inability in using thermo-sensitive drugs. In this work, a novel stamp-based microneedle fabrication method is proposed, allowing a fast room temperature production of multi-compartmental biodegradable polymeric microneedles for controlled intradermal drug release. In detail, microneedles are composed by a polyvinylpyrrolidone (PVP) fast dissolvable tip and a slow dissolving body, made of assembled porous poly(lactide-co-glycolide) (PLGA) microparticles (μPs). Microneedles ability to indent was assessed in a skin model. Controlled intradermal delivery was demonstrated loading both the tip and the body of the microneedles with a model therapeutics, POXA1b laccase from Pleurotus ostreatus, a commercial enzyme used for the whitening of skin spots. Enzyme-loaded microneedles action and their indentation ability was assessed in an advanced in vitro skin model showing their ability to control the kinetic release of the encapsulated compound.

Biography: Rezvan Jamaledin is a Ph.D. student in Industrial Product and Process Engineering at Federico secondo university. She has received her Master degree from Shahid Chamran University, Ahvaz, Iran. Her field is a vaccine, drug delivery by the microneedles.

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