Research Paper

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Bioceramic microneedles with flexible and self-swelling substrate

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Abstract

To reduce the effort required to penetrate the skin and optimize drug release profiles, bioceramic microneedle arrays with higher-aspect-ratio needles and a flexible and self-swelling substrate have been developed. Swelling of the substrate can assist in separating it from the needles and leave them in the skin as a drug depot. The preparation procedures for this bioceramic microneedle are described in the paper. Clonidine hydrochloride, the model drug, was released in a controlled manner by the microneedle device *in vitro*. Results showed that the microneedle array with a flexible and self-swelling substrate released the drug content faster than the array with a rigid substrate. Disintegration of the needle material and diffusion of the drug molecules are believed as the main control mechanisms of the drug release from these microneedle arrays. *Ex vivo* skin penetration showed that they can effectively penetrate the stratum