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Micro needles: A novel and minimally-invasive drug delivery approach to overcome limitations of hypodermic needles for bio pharmaceuticals

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Transdermal drug delivery including topical application is regarded as a potential route of delivering therapeutics that is capable of overcoming limitations of oral delivery and hypodermic injections. Among transdermal drug delivery systems, microneedles have gained a high interest due to their ability in delivering drugs with a high efficacy compared with topical application. Microneedles are referred to microscopic needles that are capable of delivering therapeutics into the skin in a minimally invasive manner. There are three main categories of microneedles; hollow type, solid type and dissolving type. Dissolving microneedles are polymeric

structures fabricated over a patch that encapsulate drug and deliver it into skin upon application. However, due to stiffness of skin, only small portion of therapeutics are delivered into the skin. Therefore, we developed a patch-less dissolving microneedle delivery system which delivers microneedles into skin through micro-pillar structures without causing pain in less than a second. We have also developed novel microneedle fabrication techniques by which activity of encapsulated biotherapeutics can be maintained at high activity levels during the fabrication process.

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