

Recent advances of microneedles for biomedical applications

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Microneedles are arrays attached to a base-supporting patch, ranging from 25 to 2000 μm in length. They can easily penetrate the stratum corneum's skin barrier but short enough to attenuate the invasion and are painless to the patient. Several researchers recently found microneedle vaccine can effectively provide immunization against infectious disease and are as helpful as a syringe used for vaccine injection.

There are four types of microneedle arrays (solid, coated, dissolving, and hollow) that have been developed to date. Every kind of microneedle has pros and cons. A solid microneedle punctures the skin's surface and applies it to the skin layer, allowing the drug to diffuse through the holes slowly. The coated microneedle is typically coated with a water-soluble drug. The hollow microneedles are similar to a conventional syringe of short length in shape, allowing liquid medication to be injected directly into the skin layer. However, these microneedles are made of non-biodegradable materials, possibly broken and left in this skin to induce a severe inflammatory response. Unlike other types, the dissolving microneedles are made of water-soluble materials, allowing cutaneous drug release once the needles contact tissue fluid and prevent possible disease without leaving the puncture wound. Dissolving microneedles are considered the safest transdermal delivery system mainly because of the selected polymers' biocompatibility and biodegradation.

In the speech, I will focus on the recent advances of dissolving microneedles for biomedical application. At the same time, I will share the results of our recent development and applications of dissolving microneedles in skin cancer and wart treatment.