

# The Rise of Polymeric Microneedles: Recent Developments, Advances, Challenges, and Applications for Transdermal Drug Delivery

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May 19, 2022

## Abstract

The current scenario for the quest of microneedles (MNs) about the property of biodegradability and biocompatibility is the thrust area of interest. Microneedles are considered to be robust and can penetrate into the skin's innermost layers are easy to manufacture and their applications in the clinical perspectives are still ongoing and ever-increasing day by day. This review paper clearly focuses upon some of the pivotal variants of polymeric microneedles namely the dissolvable and swelling-based MNs. It further explores into the drug dissolution kinetics, insertion behavior mechanisms with an emphasis on the need for mathematical modeling of MN. This review further evaluates on the fabrication methods with updates the advances in the fabrication of polymeric MNs, the choice of materials used for fabrication, the challenges in polymeric MN fabrication, the prospects of polymeric MNs with its applications in healthcare by exclusively focusing on the available literature over the erstwhile decade.

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