

Micro needle for enhancing cutaneous drug delivery

Hyungil Jung

Yonsei University, Korea

Oral administration and injection of hypodermic needle has been widely used for most drug delivery system. However, oral inoculation was primarily problematic due to drug degradation in the gastrointestinal tract, and injection caused stinging and sometimes traumas by mechanically perforating the outer skin layer. Microneedles, three-dimensional (3D) micromechanical structures with micro-scale cross sectional dimensions, have been introduced as physical enhancer for minimally invasive cutaneous drug delivery, and it have been developed to increase the permeability of the skin as bypassing morphological skin barrier and releases biomolecules (e.g., proteins, vaccines, DNA, antibodies, or genes).

Especially, microneedles can be fabricated as a solid with a drug-coated surface, a biodegradable polymer with encapsulated drug, or a hollow needle through which drug solution can be transported. However, the maximum height of hollow microneedles is only several hundred micrometers due to limitations of subtractive projection lithography, and these planar geometries were difficult penetration of the skin barrier and precise drug delivery. Also, most dissolving microneedles have been fabricated using a traditional microcasting method that cures biopolymers within three-dimensional mold, nevertheless, repeated molding process may cause damage to encapsulated drugs, a critical hurdle for clinical application. In this study, we developed new micromechanical techniques to fabricate hollow microneedle with high-aspect-ratio and dissolving microneedle with direct drug encapsulation. We anticipate that these microneedle can apply as a means of intradermal and transdermal drug delivery.

Biography

Dr. Jung has completed his Ph.D at the age of 34 years from Cornell University and postdoctoral studies from California Institute of Technology. He is the professor of Department of Biotechnology, Yonsei University. He has published novel drug delivery system in reputed journals and serving as an editorial board in Korean Society of Biotechnology and Bioengineering.