Synopsis of Original Research Paper

Development of Highly Dissolvable Painless Nano-microneedles Using Gas Permeable Porous Molds

Satoshi Takei, Rio Yamagishi, Sayaka Miura

Graduate School of Engineering, Toyama Prefectural University

This study aimed to expand the surface nano and micro-patterning techniques of highly dissolvable painless microneedle materials such as hyaluronic acid, collagen, and other substances in imprint lithography techniques using the developed inorganic gas-permeable porous molds for cosmetic applications. The microneedle materials have superior properties of skin appearance and transdermal drug delivery systems. However, because hyaluronic acid and collagen are either solid or semisolid at room temperature, and because the use of water and volatile solvents in microneedle can be a cause of pattern failure in surface nano and micro-patterning techniques, these materials have been of limited utility as microneedle for high resolution cosmetic applications. Excellent resolution nano-microneedle patterning can be achieved by diluting water or volatile solvents in imprint lithography techniques using the gas-permeable molds. Based on this study, acceptable chemistries for the imprinted materials have been expanded, which will be beneficial for future applications with various cosmetic and pharmaceutical materials containing dilution water using the gas-permeable porous molds.