

Supplementary

# Transdermal Composite Microneedle Composed of Mesoporous Iron Oxide Nanoraspberry and PVA for Androgenetic Alopecia Treatment

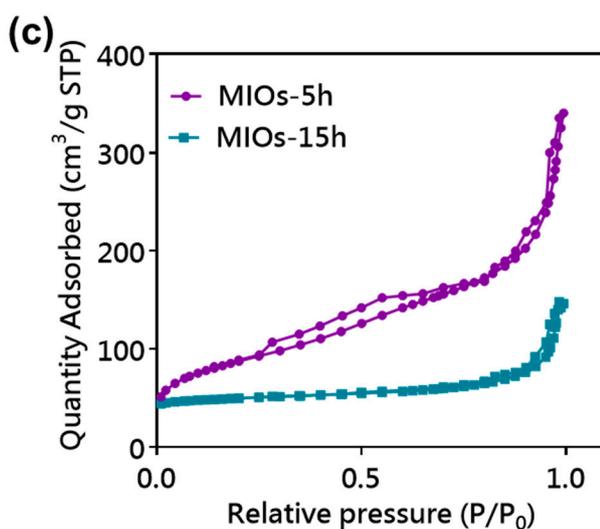
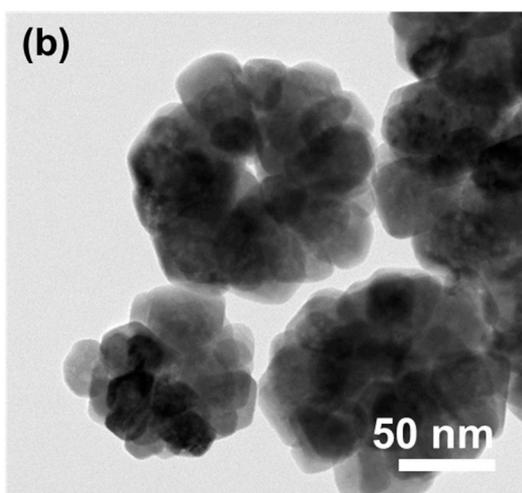
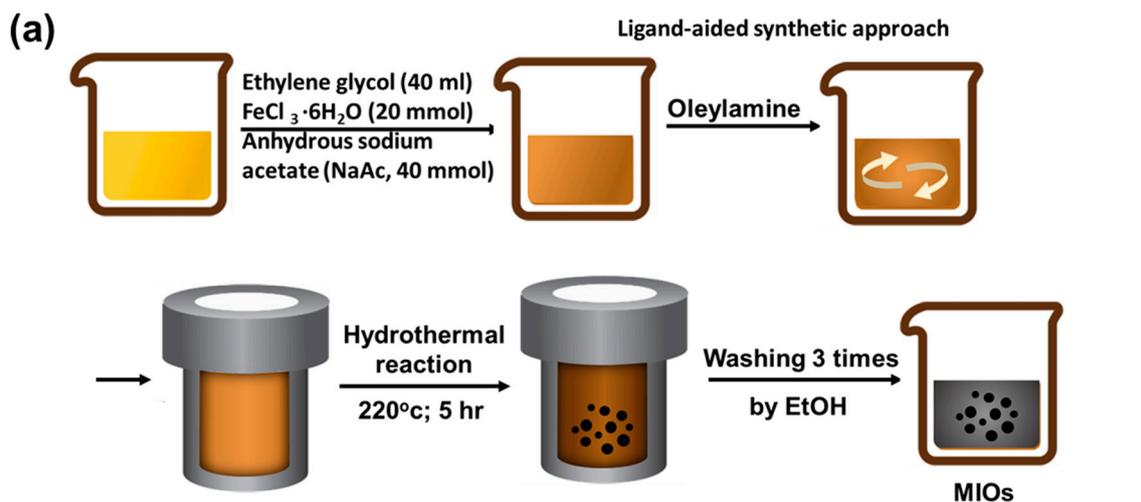
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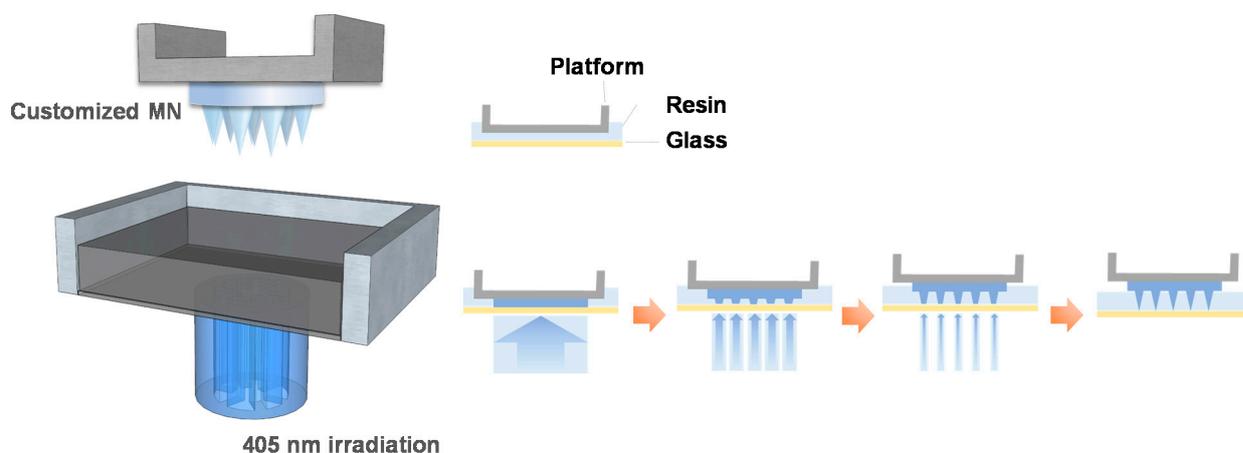
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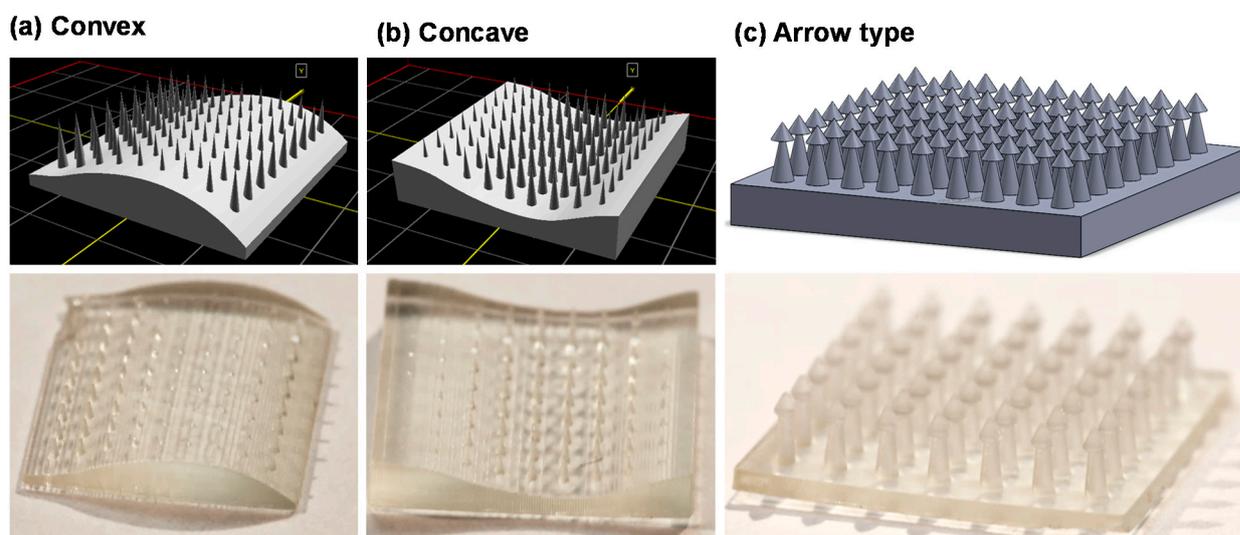
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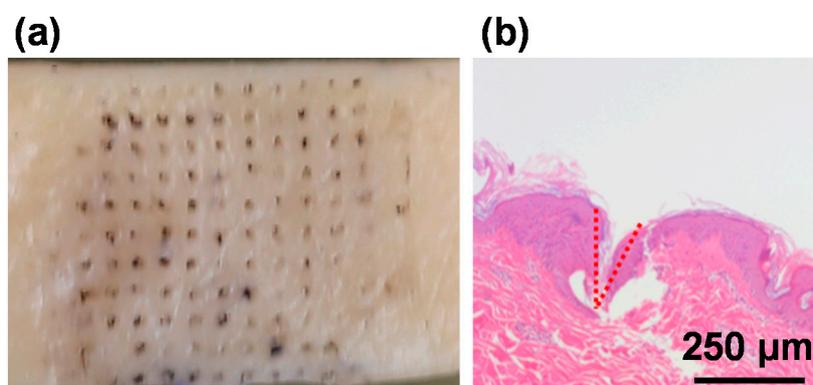
**Figure S1.** (a) Synthesis process of MIOs and hydrothermal posttreatment. (b) TEM images of MIOs-5h. (c) N<sub>2</sub> adsorption–desorption isotherms of MIOs-5h and MIOs-15h.



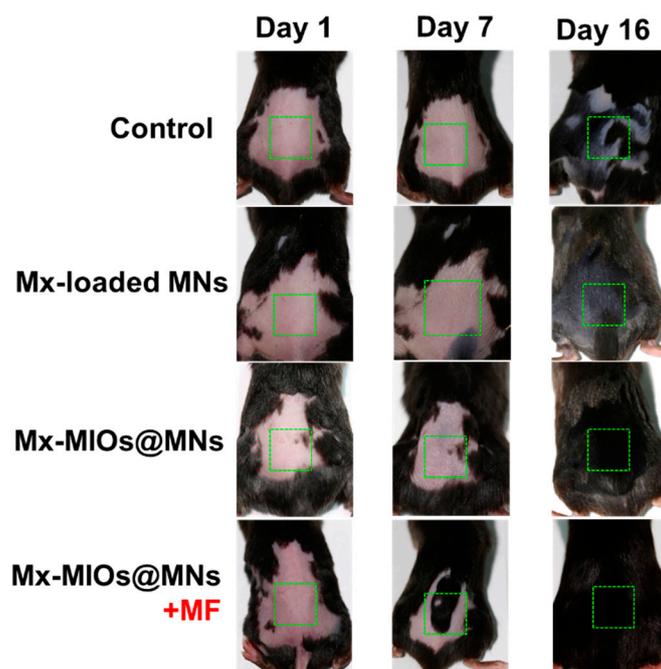
**Figure S2.** Schematic of fabrication of MNs by digital light processing (DLP) 3D printing.



**Figure S3.** The different sizes and shapes of microneedles can be designed and printed by digital light processing (DLP) process. (a) Convex, (b) concave and (c) arrow type.



**Figure S4.** Skin insertion of MNs. (a) image of skin after insertion. (b) H&E stained cross-section.



**Figure S5.** Comparison in hair growth in an alepecia model of C57BL/6 mice applied with test compound topically for over two weeks.