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3D printing microneedle patch as drug delivery system on the skin

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To enhance drug delivery through the skin barrier, the design, and fabrication of 3D printing microneedle arrays, are considered an innovative drug administration technology to deliver APIs. There are more types of microneedles such as solid, hollow, dissolving, or coated [1-2]. In my Ph.D. work, by means of additive manufacturing technique, stereolithography [3], we plan to design and fabricate solid microneedles with different parameters and combine them with *in situ* film forming system. This is a 2 steps application system when first the solid microneedle creates channels through the epidermis which increases the API permeation from the film-forming system.

Another goal of my work is to coat microneedle arrays with film forming solution and investigate the API penetration into the skin in this way.

The investigation methods for the characterization of 3D microneedles are tests of mechanical behavior by Texture Analyzer, piercing test, investigation of coating integrity and thickness, *in vitro* release and permeation studies using Franz diffusion cell, and investigation of API permeation depth by Raman spectroscopy.

The final aim of my work is to use a semi-synthetic flavonoid as API with a strong inhibiting effect on melanoma cancerous cells [4] and investigate this drug delivery system *in vitro* and *in vivo*.

References:

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