

Transparent film smoothes sagging skin back into shape

Silicone polymer mimics youthful elasticity of skin.

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Melanie Gonick/MIT

The 'second skin' film is a transparent polymer which mimics the elastic properties of skin.

Materials scientists working with cosmetics firms have developed a transparent film that, for the first time, mimics the skin's youthful elasticity. The silicone-based coating can be smeared onto the face or other areas of the body through two gel applications. Once hardened, it clings closely to the skin for more than 16 hours, says Robert Langer, a bioengineer at the Massachusetts Institute of Technology in Cambridge, who co-led development of the material.

The film — which Langer's team dubs 'second skin' — can reduce the appearance of bags under the eyes and wrinkles, and can increase the elastic recoil of skin when it is pinched, he and colleagues report in a paper published in *Nature Materials*¹. It also acts as a barrier that prevents water loss from dry skin, they report, suggesting that besides its cosmetic use, the film might offer an alternative to greasy ointments for people with skin complaints such as eczema, although it hasn't yet been trialled for that idea.

A version of the film has been on sale as a daily treatment through dermatologists since 2014, marketed by a firm called Living Proof in

Cambridge, Massachusetts, that Langer co-founded — and which film star Jennifer Aniston has invested in. (Beauty bloggers writing about the product two years ago said that it was like ‘shapewear for skin’.)

Langer calls that product a “very early version” of the material described in the research paper, which marks the first time that the film has been detailed in the scientific literature.

“Up until now, there has been nothing that could restore the elastic property of skin, and this material does that,” says Barbara Gilchrest, a dermatologist at Harvard Medical School in Boston, Massachusetts, and a co-author of the report. John Rogers, a biomaterials scientist at the University of Illinois at Urbana–Champaign, says that the team’s results are “impressive”.

The team screened more than 100 variant polymers to create the elastic yet transparent film. Users first smear on a gel-like polymer that is based on siloxanes (chains of molecules containing silicon and oxygen), and then add another gel that contains a platinum-based catalyst. This cross-links the polymer chains together to toughen up the material — effectively ‘setting’ the film — which is only 40–70 micrometres thin; Langer says it is “essentially invisible”.



Olivo Labs, LLC

Applied under the eye (left), the film temporarily restores elasticity to sagging skin.

“It’s not a cure for eye bags and wrinkles — it’s more like transparent make-up,” says Ardy Bayat, a specialist in skin biology and regeneration at the University of Manchester, UK.

By changing the chemical formulation of the film or the way that is applied, it may also be possible to use it for medical applications, says Langer — such as to hydrate dry skin, or to trap anti-inflammatory corticosteroids on the skin’s surface, thereby enhancing their absorption. He is advising another firm called Olivo Labs, a spin-off from Living Proof and also in Cambridge, that will focus on these ideas.

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References

1. Yu, B. *et al.* *Nature Mater.* <http://dx.doi.org/10.1038/NMAT4635> (2016).