

Nanotechnology shows promise as next wrinkle fighter

January 16 2007

The next big idea in preventing wrinkles is very, very small. Nano small.

A Michigan State University chemical engineer has discovered that nanoparticles can stop thin polymer films from buckling and wrinkling. It's a new solution to a critical problem as thin films become more important in new technology such as electronic monitors.

The cosmetic arsenal to fight human wrinkles embraces technologies that seems crossed with science fiction – from microdermabrasians to lasers to Botox injections – and nanoparticles are poised to join the war by warding off dreaded buckles in human skin.

Ilsoon Lee, an assistant professor of chemical engineering, along with Ph.D. student Troy Hendricks, published an online article in the American Chemical Society's *Nano Letters* in December 2006 that outlines the potential of using infinitesimally small nanoparticles – 50nm – between films to smooth out the tiny buckles that are the origin of wrinkles.

While the article addresses breakthroughs in the buckling of polymer films as they were compressed or heated during the manufacturing process, Ilsoon said the principles show promise to apply to human skin.

The research is supported by the National Science Foundation and the Michigan Economic Development Corp.

On all fronts, it's all about nailing a wrinkle before it starts.

"Everything starts at a really small scale, so if we can prevent the buckling at the very beginning – at the nano level – we can eliminate large scale wrinkles," Ilsoon said. "Wrinkles can initiate from the small scale, and when it grows we cannot remove it."

Nanoparticles already have entered the cosmetic marketplace because they can penetrate deeper into the skin, transporting vitamins and other compounds to plump and smooth tissue. But Ilsoon envisions thin films that can be injected beneath the thinning outer layer of the skin, the epidermis, that over time stiffens and buckles with aging, and the thicker dermis beneath it, which remains more pliable over time. Think of a raisin.

Ilsoon explained that nanoparticles spread in a thin film can break up the compressive forces on a plane and redirect them. Once the force is reduced below the critical buckling strain, the film will not buckle. No buckles, no wrinkles. The nanoparticles in the film can be stress busters without affecting the neighboring layers.

"The wrinkle-free films will automatically absorb or deflect the stress and stay flat, just as they are after formation," he said.

Nanoparticle films wouldn't be a face-lift itself, but Ilsoon sees the possibility in a film that could be added during a cosmetic procedure – such as an eyelift – to stabilize the improvements and prevent further wrinkling. He also sees applications in medical procedures – such as artificial skins for surgery.

The ideas are in the early stages with health and safety concerns to be worked through. Already Ilsoon's lab, with collaborators, is testing polymer films, by applying various cells and proteins to see if there are

toxic reactions.

Source: Michigan State University

Citation: Nanotechnology shows promise as next wrinkle fighter (2007, January 16) retrieved 2 May 2024 from <https://phys.org/news/2007-01-nanotechnology-wrinkle-fighter.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.