

For testing skin cream, synthetic skin may be as good as the real thing

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New research suggests that currently available types of synthetic skin may now be good enough to imitate animal skin in laboratory tests, and may be on their way to truly simulating human skin in the future.

Researchers compared the response of synthetic skins to rat skin when they were both exposed to a generic skin cream treatment, and the results indicated they both reacted similarly.

The scientists used high-resolution images of two types of synthetic skin and samples of rat skin to discover similarities on microscopic scales.

The findings have implications for the treatment of burn victims.

When a person's body is severely burned, he or she may not have enough healthy skin remaining to attempt healing the burns through skin [cell regeneration](#) with his or her own skin. In this case, synthetic skin or animal skin provides a potential substitute. But the use of animal skin comes with a variety of problems.

"In addition to ethical issues, animal skin is hard to obtain, expensive, and gives highly variable results because of individual skin variability," said Bharat Bhushan, Ohio Eminent Scholar and the Howard D. Winbigler Professor of mechanical engineering at Ohio State University.

"Animal skin will vary from animal to animal, which makes it hard to anticipate how it might affect burnt victims, individually," Bhushan said.

"But, synthetic skin's composition is consistent, making it a more reliable product," he continued.

Bhushan's research will appear in the June 5 issue of the *Journal of Applied Polymer Science*.

Bhushan and his colleague Wei Tang, an engineer at China University of Mining and Technology, compared two different types of synthetic skin to rat skin. The first synthetic skin was a commercially available skin purchased from Smooth-On, Inc. of Easton, Pennsylvania. The second synthetic skin was produced in Bhushan's lab. Ohio State's University Lab Animal Resources provided the rat skin samples.

Whether a synthetic skin feels and acts like real skin is very important, Bhushan explained. The skin must stand up to environmental effects such as sunlight or rain, while maintaining its texture and consistency. Scientists have continued to improve the practical and aesthetic properties of synthetic skin, which suggests it may soon be ready to replace animal skin and, farther in the future, human skin.

"Right now, our main concern is to determine whether the synthetic skin behaves like any real skin. Then, scientists can go on to more complex problems like modeling synthetic products that behave exactly like [human skin](#)," Bhushan said.

Bhushan is an expert at measuring effects on tiny scales, such as a nanometer, or billionth of a meter, which is important in skin research.

"Cellular events, like the effective and accurate delivery of drugs and the absorption of skincare products – these things occur at the nanoscale," explained Bhushan.

Using a highly sensitive microscope, known as an atomic force

microscope, Bhushan and Tang were able to view the skin and the affects of an applied skin cream on a scale of about 100 nanometers. The average width of a human hair is approximately 1,000 times larger.

Despite the difference in surface features between the two synthetic skins and rat skin, the skin-cream had a comparable affect on all three samples. "The skin cream reduced the surface roughness, increased the skin's ability to absorb moisture from the environment, and softened the skin surface," said Bhushan.

Even before the addition of the skin cream, the synthetic and rat skins appeared comparable. Although the synthetic skins lacked hair follicles, they had similar roughness, meaning the distance between the highest point and lowest points on the skins' surfaces were similar.

"After treatment with skin cream, the trends of the peak-to-valley distance of the two synthetic skins and rat skin were the same, and both of them decreased. This indicates the skin cream treatment smoothed the skin surface," said Bhushan.

Bhushan explains that their future work will involve improving testing methods for measuring certain properties such as surface roughness. They also want to test a different skin cream.

Provided by The Ohio State University

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