Skin-Like Prosthetic Polymer Surfaces

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Technology Summary

Artificial limbs help to restore normal function to amputees. Surface materials for prostheses need to look realistic, hold up to exposure, and mimic skin. ORNL scientists combined superhydrophobic polymer inventions with carbon nanotubes to create a self-cleaning skin-like surface material with the ability to transmit heat. This material provides an improved external covering for mechanical prosthetics.

The addition of embedded carbon nanotubes makes the ORNL prosthetic skin tougher, stronger, and more durable than conventional materials. This is a significant improvement over prosthetic materials that tend to wrinkle or distort when stretched or compressed. The vertically aligned carbon nanotubes help the surface material transmit heat much more easily than untreated polymers. In addition, the material can be adjusted for color and skin smoothness, which is highly desirable for aesthetic appeal.

To increase the superhydrophic properties of the material, the carbon nanotubes may be exposed to a high temperature annealing process. The material is also useful for forming molded shapes that include nano-patterned arrays.

Advantages

- Tougher, stronger, and more durable than conventional materials
- Thermal conductivity
- Improved skin color and smoothness options

Potential Applications

- Prosthetic limbs
- Molds with skin-like requirements

Patent

John T. Simpson and Ilia N. Ivanov, *Self-Cleaning Skin-Like Prosthetic Polymer Surfaces*, U.S. Patent Application 12/495,082 filed June 30, 2009.

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