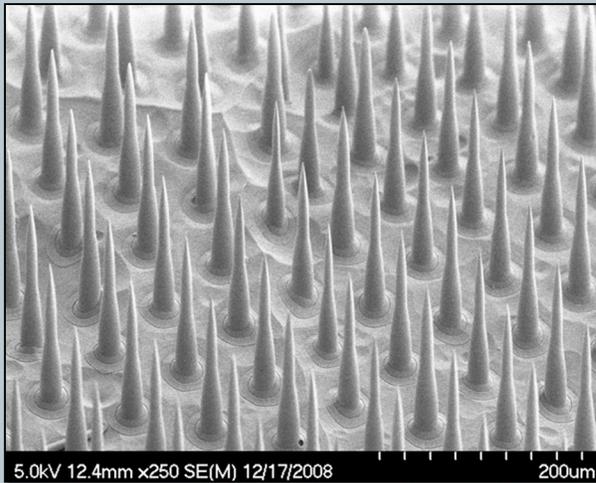


Microrod Array Treats Erosion, Delivers Drugs to Cornea

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Technology Summary

A device and a method for treating abrasion and recurrent erosion of the cornea of the eye were invented at ORNL. The cornea, responsible for two-thirds of the eye's optical power, can suffer recurrent erosion when a defect in its outermost layer, the epithelium, prevents epithelial cells from attaching to the adjacent Bowman's layer and stroma.

The device consists of an array of glass microrods, with sharp points 10 to 20 microns (millionths of a meter) in length, arranged in an array of 400 to 100,000. A surgeon can apply the microrod array to the damaged epithelium. Typically, the rods are designed to penetrate the second layer of the cornea, the Bowman's layer; however, the rods can be lengthened to penetrate the third layer, the stroma. When the microrods puncture the epithelium, they enhance the attachment of epithelial cells. This occurs as a new Bowman's layer forms over the area of puncture and fibrous adhesions attach to the epithelial layer.

The microrods can also be used to deliver drugs or gene therapy to the cornea. These include epithelial growth factor, to enhance healing and resurfacing in the defective area; anti-angiogenic factors, to inhibit neovascularization; steroids and steroid depots, to manage postoperative grafts; antibiotics and antiviral agent depots, to heal infectious lesions; mitotic inhibitors, to treat pterygia; collagenase inhibitors, to treat corneal melts; and viral and nonviral vectors, to apply corneal gene therapy.

Advantages

- Resolves drawbacks of existing methods for treating recurrent corneal erosion (such as lubrication therapy, soft contact lenses, invasive surgical intervention, and laser techniques)
- Safe, quick, effective, and less expensive than laser surgery, with no attendant risk of infectious corneal disease, reduction of vision, or painful recurrence in the affected areas

Potential Application

- Treatment of corneal abrasion and recurrent corneal erosion

Patent

Charles L. Britton, Brian R. D'Urso, Edward Chaum, John T. Simpson, Justin S. Baba, M. Nance Ericson, and Robert J. Warmack, *A Novel Microfabricated Instruments and Methods to Treat Recurrent Corneal Erosion*, U.S. Patent Application 12/052,971, filed March 21, 2008.

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