

# Novel Instruments Usher in a New Paradigm for Eye Surgery (*Cornea NanoPunch and Retina Velcro*)

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## Technology Summary

ORNL scientists working in conjunction with the Hamilton Eye Institute at the University of Tennessee–Memphis invented new methods and devices to reduce risk in surgical procedures for removing scar tissue and treating damage to the eye from corneal erosion. Retina Velcro and the Cornea NanoPunch represent significant microsurgical advancements in the invasive treatment of the eye. Both inventions can improve patient outcome and minimize the risk of vision loss from current surgical methods.

Retina Velcro features an array of microneedles or microspikes that can penetrate existing scar tissue and remove it from the surface of the retina. The array has at least one sharp feature (point) that is angled from the base of the array. Scar removal is performed either by a smooth peeling motion or by lifting the scar in one piece with the microspikes, in a manner much like surgical Velcro.

The Cornea NanoPunch is a device and method for treating recurrent erosion of the cornea. The invention features an array of glass microrods that penetrate down to the basal layer of the cornea. There the array, which has a number of sharp elements, makes microscale punctures. During the healing process, these microscale punctures enhance the ability of corneal cells to regrow and to adhere to the eye's base membrane layer. This glass microrod array can also deliver medication to the inner eye.

## Advantages

- Surgical treatment can be tailored to the needs of the unique pathology of the individual patient
- Minimal long-term damage to eye tissue
- Retinal Clinch device helps protect adjacent regions of the retina from scarring, making surgery safer and helping ensure a successful outcome
- Cornea NanoPunch enhances healing and can deliver medicine to the inner eye

## Potential Applications

- Invasive surgical treatment of eye injuries and pathologies, including retinal scarring, corneal abrasions, and recurrent corneal erosions

## Patent

Charles L. Britton, Jr., Brian R. D'Urso, Edward Chaum, John T. Simpson, Justin S. Baba, M. Nance Ericson, and Robert J. Warmack, *Novel Microfabricated Instruments and Methods to Treat Recurrent Corneal Erosion*, U.S. Patent Application 12/052,972, filed March 21, 2008.

Charles L. Britton, Jr., Brian R. D'Urso, Edward Chaum, John T. Simpson, Justin S. Baba, M. Nance Ericson, and Robert J. Warmack, *Retinal Instrument*, U.S. Patent Application 12/052,992, filed March 21, 2008.

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