

# High-Speed Liquid-Crystal Fiber-Optic Polarization Controllers

## Application:

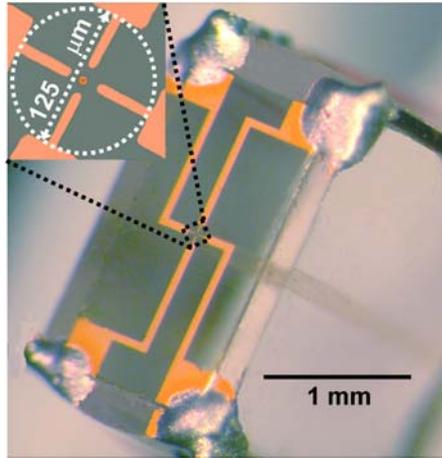
Liquid-Crystal Optical Network Devices

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## Publication:

“High-speed in-fiber nematic liquid-crystal optical modulator based on in-plane switching” *Appl. Phys. Lett.* **81**, 5243 (2002).



The liquid-crystal device is fabricated on the tip of a fiber optic. The four gold electrodes provide a transverse electric field of arbitrary direction

**Results:** A novel overdrive switching scheme was invented to provide degree/microsecond optical state switching for a liquid-crystal device fabricated on the tip of an optical fiber. A transverse electric field changes the optical axes of a liquid-crystal cell located at the junction between two optical fibers.

**Motivation:** Speeding up long-distance fiber optic networks to 40 Gbits/second requires devices that can recondition the polarization state of the propagating optical modes in response to acoustic frequency disturbances. Because of their low-cost, high optical birefringence, and low insertion-loss, thin liquid-crystal films are ideal devices if their response time can be made sufficiently fast.



Smaller than a needle, the device is located between two glass blocks encasing the optical fiber (right).