

Self-Formation of Three-Dimensional Optical Circuit

Aim

To develop a low-cost production technology for an optical interconnecting circuits that does not require a lens or a precision positioning process. Using this technology, we are also working toward long-distance communications of 100 meters or more utilizing an LED light source.

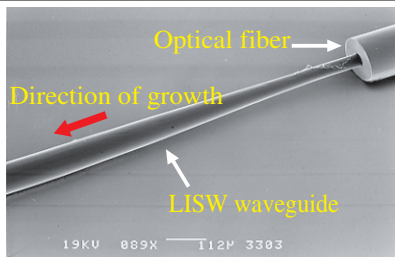
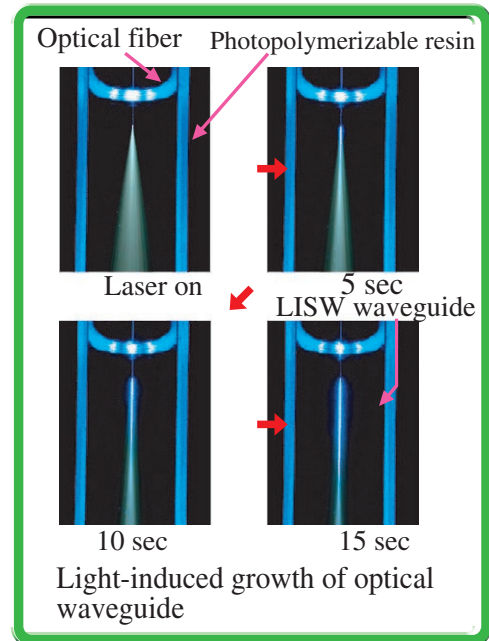
Principle

Using the outgoing light from the optical fiber to polymerize the photopolymerizable resin, utilize a phenomenon* which automatically forms the three-dimensional optical circuit (waveguide).

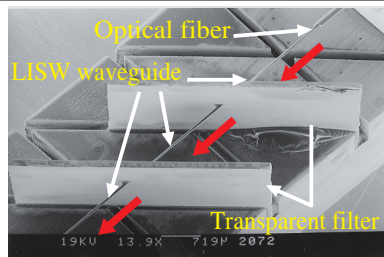
* Light-Induced Self-Written (LISW) waveguide

Characteristics

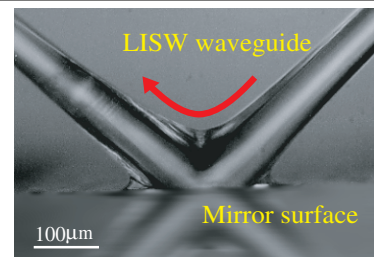
- Three-dimensional growth is possible using various filters and/or mirrors
- Passive alignment made possible through integrated forming with casing
- Low propagation loss (<1.0 dB/cm)
- Applicable to wide range of optical fiber diameters (50-1000 μm)



A. Taper portion of optical fiber



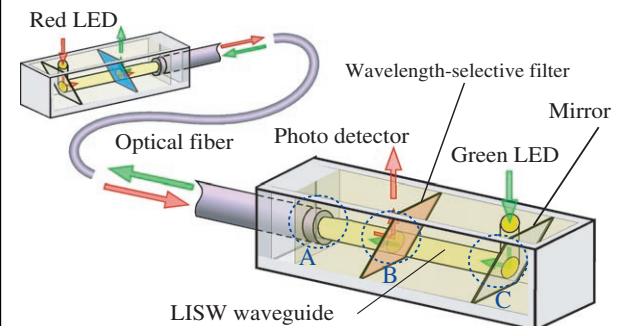
B. Regrowth from rear of transparent filter



C. Reflection on mirror surface

Application

- Two-way optical communication by single fiber
- Wavelength-multiplexing optical communication
- Optical networks in automobiles and homes
- High speed optical networks in offices and factories



Application of LISW waveguide for two-way (full-duplex) optical communications by single fiber

● Joint research with Toyota Gosei Co.,LTD