# Superconducting optical modulator

Patricia S. Bunt, Thomas G. Ference, Kenneth A. Puzey,
David B. Tanner, Nacira Tache, and Walter J. Varhue

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Abstract

An optical modulator based on the physical properties of high temperature superconductors has been fabricated and tested. The modulator was constructed form a film of Yttrium Barium Copper Oxide (YBCO) grown on undoped silicon with a buffer layer of Yttria Stabilized Zirconia. Standard lithographic procedures were used to pattern the superconducting film into a micro bridge. Optical modulation was achieved by passing IR light through the composite structure normal to the micro bridge and switching the superconducting film in the bridge region between the superconducting and non-superconducting states. In the superconducting state, IR light reflects from the superconducting film surface. When a critical current is passed through the micro bridge, it causes the film in this region to switch to the non-superconducting state allowing IR light to pass through it. Superconducting materials have the potential to switch between these two states at speeds up to 1 picosecond using electrical current. Presently, fiber optic transmission capacity is limited by the rate at which optical data can be modulated. The superconducting modulator, when combined with other components, may have the potential to increase the transmission capacity of fiber optic lines.