



Fulbright College
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Trends in New Optical Fibers: Opportunities and Challenges

Optical fiber technology has advanced dramatically over the past five decades since the first demonstration of low-loss fiber by Robert Maurer, Donald Keck, and Peter Schultz in 1970. During this time, fiber attenuation has been reduced from 17 dB/km to as low as 0.140 dB/km, while transmission capacity has increased by roughly an order of magnitude every four years, approaching the fundamental capacity limit of single-core fibers. Optical fibers and transmission technologies have enabled modern telecommunications and now form the backbone of the global Internet.

Driven by the rapid growth of data traffic from emerging applications—including high-performance computing, data storage, local and data center communications, server virtualization, cloud computing, and artificial intelligence—optical fiber technology faces new challenges in further increasing bandwidth and improving overall system performance.

This talk reviews recent advances in optical fiber technologies aimed at enhancing transmission capacity and optical interconnect density. Topics include ultra-low-loss fibers for extending transmission distance, ultra-wideband fibers that support more wavelength channels, reduced-diameter fibers for higher cable density, multicore and few-mode fibers for space-division multiplexing, multimode fibers for short-reach data center links, and hollow-core fibers enabling new applications. The opportunities provided by these emerging fiber technologies, as well as the key challenges to their practical deployment, will be discussed.

