



Presenter

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Abstract

Title: *Micro/nanofibers and microfiber coil resonators*

The recent progress in the understanding of transmission properties of optical microfibers and nanofibers and their applications in photonics are reviewed. An optical microfiber (MF) is usually fabricated from a standard telecom optical fiber by drawing and has a diameter of ~ 1 micron. The interest to photonic devices fabricated of MFs is basically caused by two advantages of MFs compared to lithographically-fabricated waveguides: significantly smaller losses for a given index contrast and the potential ability of micro-assembly in 3D. Eventually, these properties could make possible the creation of MF devices, which are significantly more compact than those fabricated lithographically. Furthermore, some MF-based devices possess functionalities, which are not possible or much harder to achieve by other means. The first part of the presentation discusses methods of fabrication and transmission properties of MFs. The effects of microdeformations and the adiabatically slow deformations of a MF are considered. The recently developed theory of adiabatic MF tapers is presented and applied to the investigation of transmission loss and evanescent field structure of MF tapers. The predicted existence of the smallest diameter of a MF that enables guiding of light is confirmed experimentally. The second part of the presentation considers MF photonic devices and, particular, the microfiber coil resonators. Generally, MF circuits can be created by the macro- and micromanipulation (bending, looping, coiling, twisting, crossing, etc.) of uniform and tapered MFs. A basic element of a MF circuit is a MF coil resonator, which can be created by wrapping a MF around a cylindrical rod. The theory and experimental demonstration of a MF coil resonator is presented. It is believed that the further exploration of MF properties and possible applications will give rise to the invention and practical realization of innovative MF photonic devices with unique functionalities.

Biography

DR. SUMETSKY graduated from St. Petersburg State University, Russia (1975) and has Ph.D. (1979) and D.Sc. (1989) degrees from the same University. From 1979 he worked at the Physics Department of St. Petersburg University of Telecommunications and from 1995 at the Bell Labs, Lucent Technologies. After transition of the Optical Fiber Research Department of Bell Labs into the OFS Labs of the Furukawa Electric Company in 2001, he joined the OFS Labs. Dr. Sumetsky has more than 100 publications in optics and quantum mechanics. His present research interests are in optics of microfibers and nanofibers.