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Basic Technology of Optical Fibers

The practical realization of optical fiber was advanced powerfully under the joint development project between Nippon Telegraph and Telephone Public Corporation and cable makers (Furukawa Electric Co., Ltd., Sumitomo Electric Industries, Ltd., Fujikura Electric Wire Co., Ltd.) between 1975 and 1983. In 1976, epoch-making low loss properties (wavelength of 1.27μm, 0.47dB/km) were realized. In 1977, Japan's original VAD method, the optical fiber manufacturing method, was invented. In addition, for graded-type optical fibers, the derivation of optimal refractive-index distribution and measuring methods for refractive-index distribution were developed for the first time. For single-mode optical fiber which later became mainstream, performance upgrading research such as on wavelength dispersion control with W-type refractive indexes advanced before the rest of the world.

VAD: Vapor-phase Axial Deposition

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Optical Fiber Cabling Technology

Achievements made by N. Uchida, et al., were as follows: establishment of the cut back method concerning light propagation loss, proposal of the parameter measurement method for optical fiber contributing to international standardization, determining the optical cable standard structure taking into account the reduction of bending force, lateral pressure, and tensile force so as to maintain the properties of the optical fiber itself, putting them to practical use, and putting obstacle detectable pulse testing machines to practical use. S. Takashima, et al., achieved the densification of optical fiber, for access use, employing a slot core structure which builds up/stores tape-type optical fiber core wire into grooves. He also realized water-tight cables excellent for work using absorptive materials. M. Yoshimura, et al., applied the SZ twisting method making after-branching easy, and thereby making subscriber line connection work effective.

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Optical Fiber Connection/Connectors

E. Sugita, et al., realized a connector which reduced connection loss with high precision position adjustment and secured its long-time reliability as well as fusion splicing technology and achieved downsizing/cost reduction. They realized a battery-powered

field-portable fusion splicer. Today, SC type connectors and MT type connectors for multicore fiber have been standardized and widely used in the world. Meanwhile, in addition to connections between optical fibers, Y. Ando, et al., developed the multicore fiber connector for parallel optical interconnecting modules which enabled connections via the waveguide between the light source (VCSEL) or PD and the optical fiber.