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Photonics Polymer for Fiber to the Display

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The biggest challenge in IT will be how to install gigabit optical fibers to local area networks at homes, offices, and buildings. However, the silica optical fibers used in the backbone of the networks have diameter less than one tenth of a hair. Therefore, installation of silica optical fibers has not been realized, as it requires enormous amounts of cost due to many connections, junctions, and handling of fibers. As the optical fiber which satisfies above issues, we are pursuing the research and development of high-speed plastic optical fiber (POF) that is Graded-Index POF (GI-POF). The GI-POF has a large core that enables easy handlings and connections as the existing metal cables, but can achieve the high-speed data transmission comparable to that of silica optical fibers. Gigabit and 10Gigabit Ethernet standards specify the use of multimode fiber and an inexpensive VCSEL as a light source. However, dispersion of multimode fibers is a serious problem particularly in the 10Gigabit transmission systems. For the premises network applications, we have proposed a low-loss perfluorinated polymer based GI-POF (PF-GI-POF). The attenuation of the current PF-GI-POF is 10 dB/km in 0.8-1.3 micrometer wavelength range. In addition, the material dispersion of the PF polymer is lower than that of silica. It is noted that more than 10 Gbps data transmission for 100m is achieved by the PF-GI-POF, which is higher than that of silica based MMF. We have been further developing high-resolution and large-sized flat panel displays that can be hung on the walls for future "Giga House" of the "Fiber to the Display". For example, when elderly people get sick late at night, it will be a great relief if they can consult doctors online with such real-time clear motion picture in large-sized display without hitting keyboard. The gigabit technology which we propose will bring us back to "Face-to-Face Communication".