EFFECT OF REFRACTIVE INDEX PROFILE ON BENDING INDUCED OPTICAL LOSS OF BEND-INSENSITIVE OPTICAL FIBER

Seongmin Ju¹, Pramod R. Watekar², Seongmook Jeong¹, Youngwoong Kim¹, Young Sik Yoon³,
Yeong Seop Lee¹, Jinhan Kim¹, and Won-Taek Han¹,²*

¹* Graduate Program of Photon Science and Technology / ²Graduate School of Information and Mechatronics
Gwangju Institute of Science and Technology – 261 Cheomdan-gwagiro, Buk-gu, Gwangju, South Korea
³Samsung Electronics Hainan Fiberoptics-Korea Co. Ltd. – 94-1, Imsoo-Dong, Gumi, Gyeong-Buk, South Korea
E-mail: wthan@gist.ac.kr

Abstract - With the advent of fiber-to-the-home (FTTH) applications in the optical fiber communication, much attention has been paid by various research groups to manufacture bend-insensitive optical fibers with innovative designs satisfying the requirements of the FTTH standard [1,2]. Several methods have been proposed to get better bend-insensitivity with single-mode condition, which are the typical examples of the so-called bend-insensitive optical fibers (BIFs), such as modification of mode-field diameter, incorporation of nano-hole cladding layers, and depression of cladding index. However, these methods are complex, expensive and have limited bend insensitivity of 1~0.03 dB/loop at 10 mm of bending diameter and also have a difficulty in splicing with the commercial single-mode optical glass fiber.

In this paper, we report the fabrication of the BIFs with low-index trench by the modified chemical vapor deposition and fiber drawing process. The BIFs showed the tremendously low bending loss of 0.005 dB/loop at 1550 nm for the bending diameter of 10 mm. We have also investigated regarding the effect of trench structures on bending insensitivity. As the width of low-index trench of the fiber increased, the bending loss was found to decrease. It was also found that the addition of depressed cladding layers and low-index trench next to core of the fiber is attractive because of no change in core diameter, so that no difficulty regarding the splicing with commercial single mode fiber arises.

Keywords: Fiber-to-the-home, Optical fiber, Bend-insensitive optical fiber, Low-index trench cladding layer, Bending loss, Modified chemical vapor deposition, Draw tower.

References