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In-
fiber polarization dependent meta-color filter INDRA GHIMIRE[1], SUDIP GURUNG, SATYENDRA K MISHRA[2], HO WAI HOWARD LEE[3], Department of Physics, Baylor University — Periodic metallic nanostructures exhibit plasmonic resonance that convert the incident optical light into two-dimensional surface propagating charge density waves (surface plasmon polaritons). These patterned metal films enable enhanced transmission at the plasmonic resonance, leading an important property to use them as ultra-compact transmission color filter. In this study, we further integrate the plasmonic nanostructure into conventional optical fiber to demonstrate an in-fiber plasmonic color filter. Meta-structures are fabricated on the core of the fiber facet by focus ion beam milling. Asymmetric negative cross meta-structures with different lengths of each perpendicular arm of 580 nm and 480 nm are fabricated. Using a broadband super continuum laser as a light source for transmission measurements, we observe distinct transmission peaks at wavelength of 1390 nm and 1670 nm for horizontal and vertical polarization respectively. The splitting of the transmission peaks for different polarization is resulted from the plasmonic resonance of the asymmetric cross structure. The nanostructured optical fibers have many potential applications, for example, as in-fiber color filters/splitters, polarization convertors, and in-fiber optical and biophotonic sensors.

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