

Abstract

In this study, A simple design of circular photonic crystal fiber filled with plasmonic nano rod is presented. The polarization characteristics and loss spectra of the proposed design are examined in detail. The simulation results are obtained by finite element method (FEM). The dispersion merits of the presented structure are considered so the effective index and spectral loss (LdB). The influence of the structure parameters including air hole radius (r) of the clad, pass (p), and number of metallic nano-rods on the dispersion characteristics of the guided core modes are presented.

The reported design has the advantage of highly order surface plasmon polariton modes and highly polarization-dependency between the two guided modes. The polarization characteristics of the circular photonic crystal fiber can be enhanced by stuffing the air hole cladding with several nano-rods. Two types of metal nano-rod used in this study, gold and silver.

The analytical study shows the properties of the presented Plasmonic PCF are strongly affected by the structure parameters. In addition, one of two core modes can be prevented from passing through the core hole according to the structure parameters variation. The reported structure can be used for filter design.