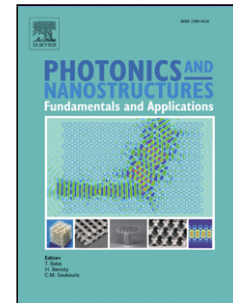


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Authors: Moutusi De, Rahul Kumar Gangwar, Vinod Kumar Singh



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Designing of Highly Birefringence, Dispersion Shifted Decagonal Photonic Crystal Fiber with Low Confinement Loss

Moutusi De*, Rahul Kumar Gangwar and Vinod Kumar Singh

Department of Applied Physics, Indian Institute of Technology (Indian School of Mines), Dhanbad 826004, Jharkhand India

*Corresponding author. Tel.: +91 326 2235641; fax: +91 3262296563

E-mail address: demoutusi@gmail.com (M.De), rahul0889@gmail.com (R.K.Gangwar), yksinghism@yahoo.com (V.K.Singh)

Highlights

1. Study of decagonal photonic crystal fiber (D-PCF) structure using FEM method.
2. This D-PCF has very high birefringence value of the order of 10^{-2} .
3. This D-PCF has low loss of the order of 10^{-2} dB/m.
4. This D-PCF has low effective area.
5. This D-PCF has zero dispersion wavelengths.

Abstract: In this article we propose a decagonal photonic crystal fiber (D-PCF) consisting unique cladding without structural complexity having very high birefringent of the order of 10^{-2} , less effective area of few square microns as well as low confinement loss of the order of 10^{-2} dB/m at $1.55\mu\text{m}$ wavelength. The zero dispersion wavelength is also achieved in the near infrared region. This study clearly attributes to the fact that the zero dispersion wavelength at the near infrared region, very high birefringence and low confinement loss can be adjusted according to the necessity by changing the structural parameters with considerable fabrication tolerance. This fiber can prove itself useful in laser technology, telecommunication, non-linear application, sensor technology and also in making polarization maintaining devices.

Key words: Decagonal photonic crystal fiber, Birefringence, Polarization maintaining fiber, Confinement loss, Effective area, Dispersion.

1. Introduction: Without any doubt invention of photonic crystal fiber (PCF) was a strong positive boost in the field of fiber optics technology. PCF is a special type of fiber whose cladding is microstructured with air holes running throughout its length and core is either solid or hollow [1]. Its unique optical properties like, low confinement loss, high birefringence, flat dispersion, high nonlinearity, endlessly single mode etc. is strongly dependent on structural parameters and from the practical point of view PCF based devices are low weights, small size, insensitive in high electromagnetic field and hazardous environment [2-6]. These make PCF point of attraction of many research groups to apply it in

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