Design and optimization of highly sensitive photonic crystal fiber with low confinement loss for ethanol detection

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Abstrak

In this paper, two highly
sensitive photonic crystal fiber (PCF) structures with microstructure core and cladding
have been demonstrated for Ethanol sensing. The
microstructure core of both proposed
PCFs is designed with supplementary holes in an octagonal formation. We have investigated the
relative sensitivity and the confinement loss of the proposed PCF structures
employing a full
vectorial finite element method (FEM). The proposed PCFs work at a wide
transmission band covering 0.8 µm to 2 µm and exhibit high sensitivity and low
confinement loss simultaneously. The numerical analysis shows that the circular shape of air holes in the first ring is a more
salient attribute for
increasing sensitivity and the presence of the square shape of air holes in the first ring shows
better performance to reduce confinement loss.