# Refractive-index tip sensor by mean of an All-Fiber Fabry–Perot Interferometer

**Julian M. Estudillo-Ayala[1], Daniel Jauregui Vazquez[1], Yanelis Lopez-Dieguez[1], Miguel Perez-Maciel[1], Juan M. Sierra-Hernandez[1], Juan C. Hernandez-Garcia[1], Roberto Rojas-Laguna[1].**

**E-mail: julian@ugto.mx, Univ. de Guanajuato, Mexico [1]**

**Abstract:** We show refractive-index tip sensor of an all Fabry-Perot(FP) interferometer made by conventional fiber and hollow-core photonic crystal fiber. We obtained two cavities that were formed at the conventional fiber tip using arc discharges by splicing tecnique and generate a Modified Intrinsic Fabry-Perot Interferometer(MIFPI). As a result of the interaction between these cavities was obtained a refractive index sensor. The MIFPI tip was immersed into a water-glycerol concentrations, these mixtures provided a refractive index variation. In addition, the MIFPI presents good resolution and sensitivity. The structure offers compactness, robustness, high repeatability, and stability measurement.

**The experimental setup** from Fig.1 was implemented, here the pumped light from the supercontinuum source (SCS), goes to the fiber optic circulator and pass until reach to the MIFPI, the reflection provided by this one is analyzed by an Optical Spectrum Analyzer (OSA).

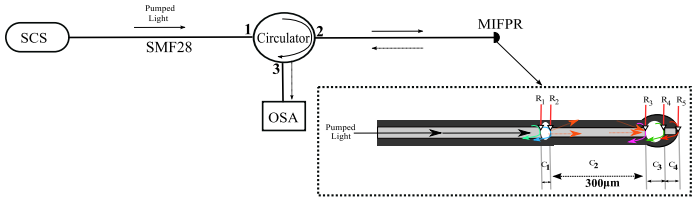


Fig 1 Experimental setup for refractive-index tip sensor.

The MIFPI was immersed into a water-glycerol concentrations, these mixtures provided a refractive index variation that can be approximated. The response of the MIFPI under different RI variation at specific wavelength range it is shown in Fig. 2.

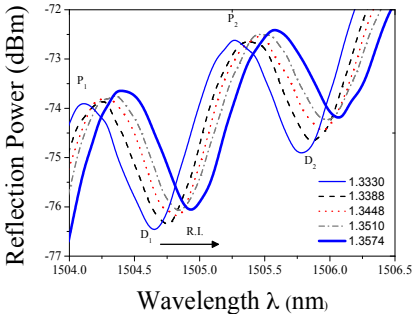


Fig. 2. MIFPI Interference spectrum for different RI estimated values.

**Conclusion:** In this work we can detect small refractive index variations from 1.3330 - 1.3574 and a resolution around 9.1*10-5 RIU was obtained by phase modulation.

**Acknowledgments:** The study was supported by the National Council of Science and Technology (Consejo Nacional de Ciencia y Tecnología or CONACYT), Mexico, projects **166361**.