

# Tapered Multimode Polymer Optical Fibers for Single Peak Fiber Bragg Grating Sensors

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**Abstract**—In this research we demonstrated the utilization of low loss commercially available multi-mode (MM) perfluorinated polymer optical fibers (POFs) for reliable and robust fiberBragg grating (FBG) based sensors development. A single peak FBG reflection spectrum is achieved by tapering GigaPOF-50SR MM fiber to a diameter just small enough to make the fiber effectively single-moded in the 1550 nm wavelength region and then inscribing the FBG in the waist section of the taper. The FBG sensor was found to have a relative humidity and strain sensitivity of  $\sim 6.7$  pm/%RH and 20 nm/% strain, respectively. The grating proved to be largely insensitive to temperature. This approach combines the main advantages of singlemode POFs (robust FBG sensing) and MMPOFs (low transmission loss) and demonstrates that tapered MM POFs constitute an efficient solution for the development of robust and reliable long distance POF FBG sensor networks.