Abstract Submitted
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Characterization of Large-Core Photonic Bandgap Fibers for Spectrally Broad Visible Light Transmission[1] E. SCHIAVONE, Carthage College, A. STOLYAROV, Y. FINK, PHOTONIC BANDGAP FIBERS AND DEVICES GROUP TEAM — Snell's law imposes a fundamental limitation on the transmission efficiency of randomly directed, broadband fluorescence signals through solid core fibers. On the other hand, guiding light through an air core fiber clad with perfect mirrors would make possible perfect collection and guidance of non-collimated and spectrally broad signals. Approaching this idealization, hollow core photonic bandgap fibers offer a flexible, light weight and concealable platform for diffuse light transport and remote chemical sensing applications. While in the small core regime, these fibers possess discrete modal properties, larger core PBG fibers have the advantage of better collection efficiencies for ambient analyte sensing and are expected to have lower losses arising from a smaller overlap of the core field with the cladding. Therefore, large-core (∼300 micron) visible transmission fibers are characterized, with cutback measurements, in order to determine the achievable transmission efficiency of these fibers along with the optimal materials and geometries for the production of optical devices that propagate light from a diffuse broadband light source. These measurements conclude that larger cores exhibit lower losses in transmission than smaller cores constructed despite a more ideal mirror.

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