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Design and analysis of Hollow-core fiber with anti-resonant structure for Ethylene Detection

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For fruit and flower transportation, ethylene gas is necessary to be detected. Various techniques are innovated, and the hollow core optical fiber is one of them. Its structure is suitable for flowing gas. So, it is used as a gas cell. This work proposed the nested hollow-core anti-resonant fiber made of Polyethylene Terephthalate (PET). Our structure is optimized to get the lowest loss at a wavelength of 3.2 um, which is related to the ethylene absorption band in the Mid-IR. The confinement loss is predicted from the numerical simulation in COMSOL. After trying to vary parameters such as core diameter and cladding tube thickness, we obtain a loss lower than 2 dB/m at the core diameter and cladding tube thickness of 108 um, and 2 um, respectively.

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