Canadian Association of Physicists

Association canadienne des physiciens et physiciennes

Contribution ID: **2582** Type: **Oral Competition (Graduate Student) / Compétition orale (Étudiant(e) du 2e ou 3e cycle)**

Gas Cell Based on Hollow-Core Fiber for Trace Gas Detection

Monday 3 June 2019 13:45 (15 minutes)

Hollow-core photonic crystal fiber (HC-PCF) was used to develop a gas cell, which was incorporated in an Intracavity Absorption Spectroscopy (ICAS) system for the detection of gas at sub-ppmv levels of concentration. One drawback of using long lengths of HC-PCF is the relatively long time required to allow the gas sample to fill the entire cell. By segmenting the fiber there will be multiple points of entry for the gas to enter. The effect of segmenting the HC-PCF on sensitivity and fill/evacuation times will be examined. The working principle of the ICAS system will also be presented, along with a comparison between both segmented and un-segmented HC-PCF cells. The motivation for developing this system is to manufacture a compact and remotely operated system at a relatively low cost, which could be placed in a fertilized agriculture field to monitor the emission of greenhouse gases (e.g., N2O). Besides the HC-PCF, all other optical components used in the system are from the telecommunication industry which reduces the cost of manufacturing the system. A fiber Bragg grating (FBG) was used to select the lasing wavelength of the cavity. The lasing wavelength chosen for the system corresponds to the absorption line of the gas species of interest. When monitoring N2O, the system operates at a wavelength of 1522 nm. The wavelength was chosen in order to avoid strong absorption lines from other gases of the atmosphere. The research was financially supported by Natural Sciences and Engineering Research Council of Canada (NSERC), Canada Foundations for Innovations (CFI), Ontario Center of Excellence (OCE) and Nutrien.

Primary authors: Mr TREVISANUTTO, Joshua (Lakehead University); Dr DAS, Gautam (Lakehead University)

Presenter: Mr TREVISANUTTO, Joshua (Lakehead University)

Session Classification: M2-1 Interaction Between Matter and Light (DAMOPC) | Interaction de la matière et de la lumière (DPAMPC)

Track Classification: Division of Atomic, Molecular and Optical Physics, Canada / Division de la physique atomique, moléculaire et photonique, Canada (DAMOPC-DPAMPC)