Canadian Association of Physicists
Association canadienne des physiciens et physiciennes

Contribution ID: **2037** Type: **Oral Competition (Graduate Student) / Compétition orale (Étudiant(e) du 2e ou 3e cycle)**

Laser-Induced Breakdown Spectroscopy as a Rapid Diagnostic Tool for Bacterial Detection and Discrimination (G)*

Tuesday 12 June 2018 16:15 (15 minutes)

Bacterial pathogens can be differentiated via an elemental analysis technique known as laser-induced breakdown spectroscopy (LIBS). This technique can be of use in the rapid identification of bacterial pathogens, for which there is a high demand, particularly in a clinical setting. The identification of bacteria with LIBS must therefore be possible with the types and numbers of bacterial cells that would be obtained from a clinical diagnostic test. This talk will introduce the underlying principles behind the technique, summarize our current progress to date, and present our efforts to advance the use of LIBS for bacterial identification in a clinical setting.

Specifically, we will describe how the laser-induced plasma is created on our bacterial targets utilizing a nanosecond pulsed laser; how the time-resolved emission spectra are collected and analyzed using a high-resolution Echelle spectrometer; and how computerized chemometric algorithms are used to differentiate the highly-similar LIBS emission spectra from different bacterial species and genera. A sample preparation method for separating the bacteria from the other unwanted biological matter that could be present in a clinical specimen will be presented. A method for mounting the bacteria that improves our bacterial limit of detection compared to previous mounting procedures will also be presented. Lastly, we will report on our efforts to detect bacteria that have been collected using pathology swabs currently in use in the clinical setting.

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Session Classification: T4-7 Physics of Biosensing (DPMB) | Physique de la biodétection (DPMB)

Track Classification: Physics in Medicine and Biology / Physique en médecine et en biologie (DPMB-DPMB)