Abstract Submitted
for the GEC20 Meeting of
The American Physical Society

Portable APPJ-OES system for trace elements detection in liquids GANDHARI BHANDARI, MOUNIR LAROUSSI, Old Dominion University — An atmospheric pressure plasma jet (APPJ) used as a non-thermal excitation source was incorporated with portable fiber optics spectrometer for trace elements detection. Water targets with various salt concentrations (1ppm, 50ppm, 100ppm, 1000ppm, 10000ppm and 50000ppm) added were prepared and treated with the plasma pencil. The operating conditions were: Gas: Argon with a flow rate of 10slm, 13slm, and 15slm; Voltage: 8.53 kV, Pulse width: 1 \$\mu$s; Frequency: 5 kHz; Distance between nozzle and liquid surface: 9 mm. The overall light emission intensity of the plasma plume was found to increase as the concentration of salt solution increased. This is the result of the increased conductivity of the sample with increasing salt concentration in the sample. Time-resolved emission spectra were recorded at a specific wavelength for Na (590nm) and Cl (837.64nm). They showed noticeable peak intensity variation with the sample concentration. The chlorine intensity was found to increase about 1.8X at 1 ppm of salt solution, however, only modest increase in Na intensity was observed reaching about 1.4X at 10000ppm when referenced to Ar plasma without liquid target, which indicates preferred Cl excitation over Na. This case study suggests the possible use of the portable APPJ-OES analytical system to detect specific trace elements, Na and Cl in this case, in liquid targets. Our results also indicate that the APPJ-OES system can serve as an accurate real-time sensor to detect variations in sample conductivity.

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Date submitted: 21 May 2020 Electronic form version 1.4