Good Morning,
You are invited to attend our weekly ECE Graduate Seminar.

Old Dominion University
College of Engineering and Technology
Department of Electrical and Computer Engineering

All lectures to be held at 3:00pm on Fridays online at
https://vs.prod.odu.edu/kvs/interface_webex/?cid=202020_ECE731ECE831VS_94044
For more information, contact Dr. Chung Hao Chen at (757) 683-3475 or email cxchen@odu.edu.

Friday, April 9, 2021 Seminar Topic:

PORTABLE APPJ-OES SYSTEM FOR TRACE ELEMENTS DETECTION IN LIQUIDS by Gandhari Bhandari, Ph.D. Candidate in the Department of Electrical and Computer Engineering at Old Dominion University

Abstract:
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 µs; 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.

Bio:
Gandhari Bhandari is a PhD candidate in the Dept. of Electrical and Computer Engineering at Old Dominion University, working on her dissertation under the supervision of Dr. Laroussi. She received MSc in Physics from Tribhuvan University, Nepal. Her research interests include use of pulsed dc plasma jet as a source to excite species for detecting trace contaminant, zero dimensional computational analysis of kinetics and chemistry of different gas mixture of plasma jet.