

## **Seminar Talk**

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**Friday, October 05, 2018**  
**3:00 p.m. KH 224**

**Title:** Spark-Assisted Laser Multicharged Ion Source

**Abstract:**

Multicharged ions (MCI) sources are of interest for their utilization in surface modification, e.g., etching and deposition, for ion implantation, and for fundamental studies of ion-surface interactions. The laser-matter interaction produces dense plasma consisting of ions, electrons, clusters, and neutral particles. A spark-assisted laser multicharged ion (SALMCI) source is developed to enhance the plasma ionization by depositing spark energy into the laser ablated plume. The SALMCI source is composed of a laser MCI source and a separate spark stage to deposit energy into the laser-ablated plasma. With amplification stage (spark discharge energy of 1.25 J) and laser pulse energy (72 mJ/pulse), the total charge measured increases by a factor of ~9 and charge state up to Al<sup>6+</sup> was observed compared to Al<sup>3+</sup> generated with only the laser pulse. This approach also minimizes target damage by the laser pulse since the laser is mainly used to introduce the vapor into the spark while the energy delivered by the spark is used to heat the plasma increasing MCI production.

**Bio:**

Md. Haider Shaim is working with professor Hani Elsayed-Ali as a Research Assistant at the Applied Research Center and is a Ph.D. candidate in the Department of Electrical and Computer Engineering at Old Dominion University. Haider's research focuses on the development of a state-of-the-art multicharged ion deposition and implantation system for nanofabrication and its utilization to implant semiconductor devices for optical detectors such as for silicon carbide detectors. He worked to develop a compact and cost-effective multicharged ion source based on laser-plasma coupled to a spark discharge. The results obtained are of interest to researchers developing ion beam instruments and utilizing them for nano/microfabrication. Haider has published eight articles in journals with high impact factor and presented in several conferences. In recognition of his work, he received the Engineering Deans Graduate Fellowship in 2015, the ECE Faculty award in 2016, and the Meredith Construction Company Scholarship in 2017.