

## Nuclear Engineering Seminar

# Dr. Steven Shannon

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**Wednesday, February 14, 2024**

**3:30pm | PHYS 112**

Ion-material interactions for critical etch processes

### Abstract

Plasma assisted materials processing plays a major role in semiconductor manufacturing. Plasma sources are used in over 25% of the 500+ steps it takes to fabricate an integrated circuit. One of the compelling advantages that plasma processing provides is the ability to drive material growth and material removal anisotropically to form high aspect ratio vertical features that are critical components in both logic and memory devices. In this talk, some of the recent efforts undertaken at NC State to advance these critical technologies will be presented. Specifically, three recent projects will be summarized: 1.) Molecular dynamic modelling of glancing angle ion interactions with high aspect ratio sidewalls, 2.) cathode design to control ion angle of incidence near the cathode edge, and 3.) development of a high aspect ratio sidewall charge measurement diagnostic to measure local fields inside one of these features. This work has been supported through grants from the US Department of Energy and Samsung Electronics as well as through continued support from the State of North Carolina.



Steven Shannon is Professor and Director of Graduate Programs for the Nuclear Engineering Department at North Carolina State University, where he directs research in plasma source design, characterization, modeling, and application. After graduating from the Department of Nuclear Engineering and Radiological Sciences at the University of Michigan in 1999 he spent nine years as a member of the technical staff at Applied Materials in Santa Clara CA while also holding an adjunct faculty position in the Chemical and Materials Engineering Department at San Jose State University where he taught courses in measurement of material properties, semiconductor device fabrication, ion beam interactions with materials, and plasma processing. He joined the faculty at NC State in 2008 and became the Director of Graduate Programs in 2020.