

## Dean's Colloquium

Dr. Aswini Pradhan, Associate Professor  
Department of Physics, Hampton University



**When: Wednesday, February 22, 2023**

**Where: Turner 129**

**Time: 3:30 – 3:50 pm, Q&A: 10 min**

### **Title: Degenerate Semiconductors for Multifunctional Applications**

**Abstract:** Metamaterials (MMs), featuring large static or dynamic tunability, are attractive optical materials owing to their potential for applications in transformative optics, telecommunications, energy, and biomedical areas. Among MMs, the carrier concentration and mobility are two tunable parameters, which control the plasma frequency of a metal. I will discuss on large static and dynamic tunability up to a large wavelength in transparent conducting degenerate semiconductors by controlling both thickness and applied voltages. This extreme tunability is ascribed to an increase in carrier concentration with increasing thickness as well as voltage-induced thermal effects that eventually diminish the carrier concentration and mobility due to complex chemical transformation in multilayer growth process. These observations could pave the way for manipulation of MMs for potential transformative applications, including transparent smart heater and other multifunctional applications, such as IR imaging, radiation detectors etc.

**Bio:** Dr. Aswini Pradhan joined HU in August 2022 as a faculty of Physics Department. Dr. Pradhan has excellent research and teaching accomplishments at national and international level, including at Norfolk State, Virginia Commonwealth University University of Virginia, and internationally acclaimed organizations, such as, ISTEK-Japan, famous Physics Departments at Tokyo University and Clarendon Lab (Oxford University). He has made several very important innovative and original research discoveries in the field of applied physics/materials science in a broad interdisciplinary area, including advanced functional materials, nanomaterials for energy harvesting and biomedical applications. He has extensive record of scholarly achievements and publications with more than 480 refereed papers in reputed international journals. He the recipient of 2015- State Council of Higher Education of Virginia (SCHEV) award for Outstanding Faculty of Virginia. Dr. Pradhan is a champion of mentoring a cohort of diverse graduate and undergraduate students. He received more than 30 million dollars grant from various funding agencies. He is in editorial board of several international journals.