Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Structural and electrical properties of silicon hyperdoped with gold JAY MATHEWS, Department of Physics, University of Dayton, YINING LIU, Electro-Optics Program, University of Dayton, GIRISH MALLADI, HARRY EFSTATHIADIS, SUNY Polytechnic Institute, JEFFREY WARRENDER, US Army ARDEC-Bent Labs — Recent advances in the field of laser hyperdoping have produced a new class of materials that could lead the way to silicon-based, CMOS-compatible infrared detectors. Using the method of ion implantation followed by pulsed laser melting (II-PLM), silicon films with impurities at concentrations well above the solid solubility limit can be fabricated. Recent work has centered around Si:Au, from which prototype IR detectors have been successfully fabricated, but there are still many questions about the structural, electrical, and optical properties of this material. In order to enhance the infrared absorption and achieve high-efficiency devices, a thorough understanding of these properties is necessary, and the processes for device fabrication must be optimized. In this work, we explore the structural and electrical properties of Si:Au hyperdoped films. Si:Au films were annealed at various temperatures, and RBS channeling was used to measure the fraction of Au atoms sitting at substitutional sites. Additionally, transmission line method (TLM) and van der Pauw (VDP) test structures were fabricated in order to investigate formation of Ohmic contacts on the hyperdoped films and to study the electrical properties of Si:Au.

Jay Mathews
Department of Physics, University of Dayton

Date submitted: 06 Nov 2015 Electronic form version 1.4