Abstract Submitted
for the OSF19 Meeting of
The American Physical Society

Hyperdoping Silicon For Infrared Detection and Night Vision Applications[1] PETER HADCHITI, YINING LIU, Univ of Dayton, WENJIE YANG, Australian Ntl Univ, QUENTIN HUDSPETH, U.S. Army Combat Capabilities Dev Command - Armament Ctr, ANDREW SARANGAN, IMAD AGHA, Univ of Dayton, JEFFREY WARRENDER, U.S. Army Combat Capabilities Dev Command - Armament Ctr, JAMES WILLIAMS, Australian Ntl Univ, JAY MATHEWS, Univ of Dayton — Infrared (IR) detection has many commercial applications such as in night vision and fiber optic communications. Current night vision devices are large and low-res, and can't be integrated with consumer electronics. Being able to make silicon (Si) based IR detectors would make it substantially cheaper and easier to integrate IR imaging and other optical systems into consumer devices. Si is useful for electronic devices, but isn't a good material for IR imaging because it doesn't efficiently absorb IR light. By adding impurities to Si in a process called hyperdoping, IR absorption can be induced, which could lead to Si-based low-light imaging. It's been shown that hyperdoped Si can detect IR light, but only at low efficiency. Our research has been in manipulating the doping and fabrication processes to increase the efficiency of Si-based IR detectors. We have fabricated new photodetectors based on these improvements, and I measured the optical and electrical properties of these devices. The new devices show improvement of nearly two orders of magnitude in the infrared photoresponse from what has already been shown, demonstrating this material's potential for infrared imaging.

[1]I would like to thank the University of Dayton Nanofabrication Lab for their role in the fabrication of our devices This research was funded through Office of Naval Research, grant number N000141612864, and US Army ARDEC, grant number W15QKN1620001. Additional funding was provided through the UD Physics Summer Research Experience (PSRE) and the UD Graduate Student Summer Fellowship (GSSF).

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Date submitted: 26 Sep 2019 Electronic form version 1.4