Abstract Submitted
for the DAMOP13 Meeting of
The American Physical Society

Sulfur-doped microstructures formed in silicon using a modulated continuous wave laser R. AYACHITULA, US Air Force Academy - Laser and Optics Research Center, L. BRANDT, US Air Force Academy, M. CHILTON, R.J. KNIZE, US Air Force Academy - Laser and Optics Research Center, B.M. PATTERSON, US Air Force Academy — We demonstrate the enhanced optical properties of silicon microstructures formed by irradiation of a silicon surface by a modulated continuous wave (CW) laser beam in the presence of SF_6. The microstructures are doped with about 0.6% sulfur, which extends the absorption well below the 1.1μm bandgap of crystalline silicon and results in a 60% increase in the absorption of infrared radiation. This enhanced absorption as a result of these microstructures has been studied over the past decade in an effort to create high responsivity detectors and night vision goggles and improve the efficiency of solar cells. The enhanced optical absorption data we demonstrate are comparable to observations made in previous studies which were performed using more expensive and complicated laser systems such as regeneratively-amplified femtosecond pulsed laser systems and nanosecond and picosecond pulsed excimer lasers.

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Date submitted: 30 Jan 2013 Electronic form version 1.4