Abstract Submitted
for the OSS17 Meeting of
The American Physical Society

Microwave Power Detectors based on Graphene MICHAEL GASPER, NITIN PARSA, RYAN TOONEN, University of Akron — We have created microwave power detectors by microfabricating Corbino disc test structures on top of commercial, CVD-grown monolayer graphene. The microstructures were fabricated by first depositing a blanket metallic thin film over the graphene in order to prevent exfoliation during the subsequent photolithographic process. The thin film consisted of a 50 nm silver conduction layer over a 5 nm titanium adhesion layer. The test structures were etched from the thin film using photoresist as an etch stop. Raman spectroscopy, performed on unprocessed and processed samples (having microstructures), revealed that the graphene remained intact during and after the microfabrication process, but the processing caused some damage to the graphene–as evidenced by spectral peaks corresponding to disordered carbon. Room temperature, power detection measurements indicate that the power detectors can reach a sensitivity of 0.87 mV/mW at 433.92 MHz. Because the drain-current-versus-gate-voltage ambipolar signature occurred out of our gate voltage range, we have attributed the mechanism of power detection to a bolometric effect. Additional experiments have been conducted over a range of Corbino disc dimensions to investigate the effects of these parameters on the power sensitivity.

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Date submitted: 07 Apr 2017 Electronic form version 1.4