Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Multi-terminal Two-color ZnCdSe/ZnCdMgSe Based Quantum-well Infrared Photodetector YASIN KAYA, Princeton Univ, ARVIND RAVIKUMAR[1], GUOPENG CHEN, Department of Electrical Engineering, The City College of New York, NY 10031, USA, MARIA C. TAMARGO, Department of Chemistry, The City College of New York, NY 10031, USA, AIDONG SHEN, Department of Electrical Engineering, The City College of New York, NY 10031, USA, CLAIRE GMACHL, Department of Electrical Engineering, Princeton University, Princeton, NJ 08544, USA — Target recognition and identification applications benefits from two-color infrared (IR) detectors in the mid and long-wavelength IR regions. Currently, InGaAs/AlGaAs and GaAs/AlGaAs multiple quantum wells (QWs) grown on GaAs substrate are the most commonly used two-color QW IR photodetectors (QWIPs). However, the lattice-mismatch and the buildup of strain limit the number of QWs that can be grown, in turn increasing the dark current noise, and limiting the device detectivity.

In this work, we report on two-color QWIPs based on the large conduction band offset ($\sim$1.12ev) ZnCdSe/ZnCdMgSe material system lattice matched to InP. QWIPs were designed based on a bound to quasi-bound transition, centered at 4 μm and 7 μm and each QW is repeated 50 times to eliminate the high dark current and a contact layer is inserted between the two stacks of QWs for independent electrical contacts. Wafers are processed into two step rectangular mesas by lithography and wet etching. Experiments showed absorption spectra centered at 4.9 μm and 7.6 μm at 80 K and the full width at half maximums were $\Delta\lambda/\lambda = 21\%$ and $\Delta\lambda/\lambda = 23\%$, respectively. Current work studies the Johnson and the background noise limited detectivities of these QWIPs.

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Date submitted: 06 Nov 2015 Electronic form version 1.4