Abstract Submitted
for the TSF07 Meeting of
The American Physical Society

Second harmonic generation in the near-infrared range in high conduction band offset heterostructures[1] YONG HEE CHO, ALEXEY BELYANIN, Department of Physics, Texas A&M University at College Station, College Station, Texas 77843 — It is well known that asymmetric coupled semiconductor quantum wells possess giant optical nonlinearities associated with resonant intersubband transitions. These systems attracted a lot of interest in the last several years due to their unmatched flexibility in design and possibility of integration with optoelectronic devices. At the same time, the spectral range covered by devices based on intersubband nonlinearities has been limited to mid/far-infrared wavelengths due to low conduction band offset in most popular GaAs/AlGaAs and InGaAs/AlInAs material systems. Here we analyze the potential of high conduction band offset heterostructures for efficient second harmonic generation (SHG) in the near-infrared range 1-1.6 μm. We concentrate on $Ga_{0.47}In_{0.53}As/AlAs_{0.56}Sb_{0.44}$ heterostructures that are lattice matched to InP. Their conduction band offset in the Gamma-valley is as high as 1.6 eV. Such quantum wells can be grown on InP substrate; they utilize superior thermal and optical qualities of InP and mature InP technology. We find the optimal asymmetric double quantum well design which maximizes the second-order nonlinearity and discuss the nonlinear conversion efficiency for various geometries.

[1]This work was supported by NSF GrantsECS-0547019, EEC-0540832, and OISE 0530220, and AFOSRgrant FA9550-05-1-0435.

Yong Hee Cho
Department of Physics, Texas A&M University
at College Station, College Station, Texas 77843

Date submitted: 28 Sep 2007 Electronic form version 1.4