

Wide wavelength conversion in P-type doped quantum dot semiconductor optical amplifiers

Authors: Omar Qasaimeh

Abstract: The spectral characteristics of up and down wavelength/energy conversion via cross-gain modulation in doped and undoped quantum dot (QD) semiconductor optical amplifier (SOA) have been studied using the multi-population coupled rate equation model. Our analysis reveals that flexible broadband conversion from low to high energy (90meV) and from high to low energy (30 meV) can be obtained in P-type doped QD-SOA with 01 dB output power variation. We find that the tuning range of undoped QD-SOA converter is limited by the contrast ratio for low to high energy conversion and by the conversion efficiency uniformity For high to low energy conversion. Our analysis reveals that doping the dots by P-type concentration Significantly increases the contrast ratio and consequently enhances the tuning range of low to high energy conversion. However we find that at high P-type concentration, the contrast ratio and the modulation bandwidth will be improved but the conversion efficiency will be reduced.