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Broadband Gain-Clamped Linear Quantum Dash Optical Amplifiers

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Abstract: The linear optical gain of gain-clamped quantum dash semiconductor optical amplifiers (GCSOAs) has been investigated using the rate equation model. The gain spectrum of GCSOA for different wavelength detuning and different doping has been studied. Our analysis shows that the linear gain can be increased as the laser wavelength is detuned to high wavelength where the peak of the optical gain, which is found at wavelengths below the ground state wavelength, is shifted to lower wavelength as the laser wavelength is increased. We find that doping the dashes by either N-type or P-type enhances the linear optical gain and shifts the gain peak to lower wavelength. Moreover, we found that GCSOA with lightly N-type doping demonstrates large separation between the laser and the amplifier wavelength. Also we find that small inhomogeneous line broadening enhances the linear gain peak, shifts the gain peak to wavelength lower than the GS wavelength and widens the gain spectrum.