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## Effect of doping and energy detuning on the gain and crosstalk of quantum dot gain-clamp semiconductor optical amplifiers

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**Abstract:** The spectral characteristics of the linear gain and the small-signal crosstalk of positively detuned and negatively detuned quantum dot gain-clamped semiconductor optical amplifiers (QDGC-SOA) have been studied. Our analysis reveals that the linear gain of the ground-state in positively detuned QDGC-SOA can be enhanced by doping the dots by p-type concentration, while the linear gain of the excited-state in negatively detuned QDGC-SOA can be enhanced by doping the dots by n-type concentration. The small-signal crosstalk is found to be proportional to the amplification where we find that positively detuned QDGC-SOA exhibits less crosstalk (by at least 3 dB) than negatively detuned QDGC-SOA. In addition, we find that positively detuned QDGC-SOA is capable of providing larger optical gain.