Acceleration of carrier lifetime in gain-clamped semiconductor optical amplifiers

ABSTRACT

A new method to accelerate the carrier lifetime in semiconductor optical amplifiers (SOAs) is experimentally demonstrated. The four-wave mixing (FWM) effect is induced without recourse to external optical light sources. A pair of fiber Bragg gratings is utilized to generate pre-spectral sliced seed light channels as FWM inputs, by reflecting the backward amplified spontaneous emission from the SOA in a gain-clamped configuration. The theory predicts a three times shorter carrier lifetime, compared to coherent inputs in a travelling-wave arrangement. Furthermore, this method can be a more accurate measure of the nonlinear parameters of SOAs rather than conventional techniques, owing to the polarization-independent nature of the corresponding incoherent products.

Keyword: Semiconductor optical amplifier (SOAs); Carrier lifetime; Gain-clamping; Fourwave mixing