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# S - C - L triple wavelength superluminescent source based on an ultra-wideband SOA and FBGs

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## Abstract

### CONTROL OF LASER RADIATION PARAMETERS

We propose and demonstrate a wide-band semiconductor optical amplifier (SOA) based triple-wavelength superluminescent source with the output in the S-, C- and L-band regions. The proposed systems uses an ultra-wideband SOA with an amplification range from 1440 to 1620 nm as the linear gain medium. Three fibre Bragg gratings (FBGs) with centre wavelengths of 1500, 1540 and 1580 nm are used to generate the lasing wavelengths in the S-, C- and L-bands respectively, while a variable optical attenuator is used to finely balance the optical powers of the lasing wavelengths. The ultra-wideband SOA generates an amplified spontaneous emission (ASE) spectrum with a peak power of -33 dBm at the highest SOA drive current, and also demonstrates a down-shift in the centre wavelength of the generated spectrum due to the spatial distribution of the carrier densities. The S-band wavelength is the dominant wavelength at high drive currents, with an output power of -6 dBm as compared to the C- and L-bands, which only have powers of -11 and -10 dBm, respectively. All wavelengths have a high average signal-to-noise ratio more than 60 dB at the highest drive current of 390 mA, and the system also shows a high degree of stability, with power fluctuations of less than 3 dB within 70 min. The proposed system can find many applications where a wide-band and stable laser source is crucial, such as in communications and sensing.

## Keywords

ultra-wideband semiconductor optical amplifier, S-, C-, L-band superluminescent source.

## PACS

42.55.Px Semiconductor lasers; laser diodes

42.60.Lh Efficiency, stability, gain, and other operational parameters

42.81.Qb Fiber waveguides, couplers, and arrays

42.79.Sz Optical communication systems, multiplexers, and demultiplexers

42.79.Dj Gratings

## Subjects

Optics, quantum optics and lasers

## Dates

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