

## Multi-wavelength L-band Brillouin-erbium comb fiber laser utilizing nonlinear amplifying loop mirror

### ABSTRACT

In this paper, we demonstrate a novel multiwavelength L-band Brillouin–erbium fiber laser utilizing nonlinear amplifying loop mirror. The erbium-doped fiber section in the fiber loop mirror provides efficient amplification of Brillouin pump (BP) to generate the stimulated Brillouin scattering in the single-mode fiber coil. The laser structure can achieve symmetry breaking of the loop without requirements to an asymmetric coupler or polarization controller. The proposed fiber laser has a low threshold power of about 10 mW to create the first Brillouin–Stokes signal. The maximum number of 27 Stokes signals with a spacing of 0.089 nm is achieved by setting the BP wavelength at 1604 nm and its BP power is set at 2.2 mW.

**Keyword:** Brillouin scattering; Erbium; Nonlinear optics; Optical fiber lasers