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DESIGN OF A LOOP EDFA BASED C+L BAND TUNABLE ERBIUM DOPED FIBER RING LASER

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In this study, we experimentally demonstrate a C+L band tunable erbium doped fiber ring laser (EDFRL) based on a loop design of erbium doped fiber amplifier (EDFA). With the proposed EDFRL architecture, the forward and backward amplified spontaneous emission (ASE) signals of a bi-directionally pumped loop EDFA are combined in a 3-dB coupler and redirected to the tunable ring laser through a wideband optical circulator. An optical tunable band pass filter (TBPF) with a micro-electro-mechanical system (MEMS) is used in order to select lasing wavelength from a wide range from 1525 nm to 1610 nm. In this study, firstly, the length of erbium doped fiber (EDF) is changed to optimize the laser output power and the tuning wavelength range while the output tap coupler ratio is 50%. The results have shown that six meter of EDF has a wider tuning wavelength range and more stable laser output characteristics than 7.5 meter of EDF. Secondly, the effect of coupling ratio on the output power and tuning performance of EDFRL is investigated. As it is expected, the lasing output power of proposed EDFRL is higher at 50% output coupler tap ratio than 10% output coupler tap ratio. On the other hand, the wavelength tuning range is wider when the output tap coupler ratio is 10%. As a result, the proposed loop EDFA based EDFRL structure can be used in wideband optical transmission and sensor applications due to its 70 nm wide tuning range which covers C+L band and a high output power over 0 dBm.

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