LASER & PHOTONICS REVIEWS

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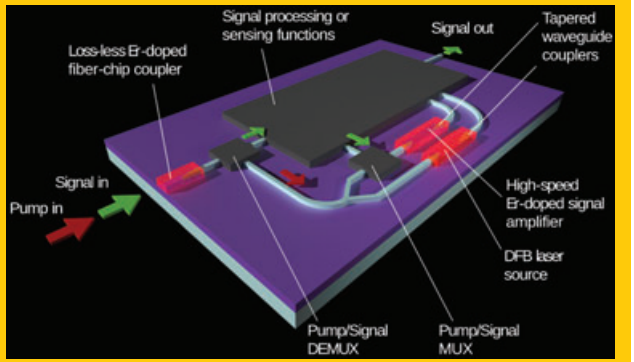
Abstract Erbium-doped fiber devices have been extraordinarily successful due to their broad optical gain around 1.5–1.6 µm. Er-doped fiber amplifiers enable efficient, stable amplification of high-speed, wavelength-division-multiplexed signals, thus continue to dominate as part of the backbone of longhaul telecommunications networks. At the same time, Er-doped fiber lasers see many applications in telecommunications as well as in biomedical and sensing environments. Over the last 20 years significant efforts have been made to bring these advantages to the chip level. Device integration decreases the overall size and cost and potentially allows for the combination of many functions on a single tiny chip. Besides technological issues connected to the shorter device lengths and correspondingly higher Er concentrations required for high gain, the choice of appropriate host material as well as many design issues come into play in such devices. In this contribution the important developments in the field of Er-doped integrated waveguide amplifiers and lasers are reviewed and current and future potential applications are explored. The vision of integrating such Er-doped gain devices with other, passive materials platforms, such as silicon photonics, is discussed.



Erbium-doped integrated waveguide amplifiers and lasers

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