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Low-Cost High-Speed Lasers Based on Surface Defined Lateral Gratings

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For next generation high-speed datacom links (e.g., 100 GBit/s Ethernet) and future high speed local area networks low-cost high-performance directly modulated lasers are needed. Usually one has to assume that a high device performance is in contradiction with a low-cost fabrication technology. However, with nano-imprint lithography (NIL) a large volume mass production technology is available, which allows the optimization of optoelectronic device designs down to the nanoscale in a single pattern definition process. A NIL compatible fabrication process based on surface defined laterally etched gratings are developed, which allows the realization of high performance DFB and DBR lasers by a single step lithography and etch process without any epitaxial overgrowth. A brief review will be given about the fabrication process and the application of this low-cost process for the realization of 1.55 μm multi-section single mode lasers. Side mode suppression ratios of more than 50 dB with a 400 μm long 2nd order grating and modulation bandwidths of more than 15 GHz is obtained. Static and dynamic properties will be presented as well as the possibility discussed to largely extend the modulation bandwidth for a given laser material by utilizing higher order photonic modes like the photon-photon mode in a coupled cavity injection grating (CCIG) design [1-3].

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