THE DISTRIBUTED FEEDBACK LASER BASED ON DOPED NEMATIC LIQUID CRYSTAL

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S u m m a r y

We have studied distributed feedback (DFB) lasers based on doped nematic liquid crystals (NLCs). Two optical schemes for the formation of an interference pump distribution are considered, namely, the excitation by a co- or counterpropagating pumping beam. The spectroscopic features of a number of dyes as NLC dopants are analyzed, and pyromethene dyes are adopted as the most promising for the DFB-laser fabrication. The conditions needed for a laser with dynamic DFB in NLC and a similar laser with static DFB in a cholesteric liquid crystal (CLC) to operate are compared. The modulation depth of a phase grating, which governed the lasing threshold, turned out approximately two orders of magnitude larger in CLCs than in NLCs, provided the dynamic formation of the grating by the laser pump field. The lasing by an NLC on the dynamic DFB has been obtained for the first time. Various ways to optimize the key parameters of the lasing with frequency tuning are analyzed and experimentally tested for both pumping schemes.