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Title: Multiple-wavelength lasing by multiform self-frequency conversion in Nd3+-doped La2CaB10O19 crystals

Authors:Zhang, J.X. (1); Han, L. (1); Wu, Y. (1); Zong, N. (1); Fu, P.Z. (1); Wang, B.S. (1); Zhang, G.C. (1); Xu, Z.Y. (1); Wu, Y.C. (1)

Author affiliation:(1) Key Laboratory of Functional Crystals and Laser Technology, Technical Institute of Physics and Chemistry, Chinese Academy of Sciences, Beijing 100190, China; (2) Graduate School, Chinese Academy of Sciences, Beijing 100039, China

Corresponding author:Wu, Y.C.

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Abstract: The self-sum-frequency process was firstly demonstrated in Nd3+-doped La2CaB10O19 (LCB) crystal. In addition, simultaneous participation of the fundamental laser in multi-self-frequency conversion including the self-frequency doubling was reported. Emissions at five different wavelengths (525, 529, 533.6, 1050 and 1069 nm) were simultaneously obtained. The output power of the three green visible lasers (525, 529 and 533.6 nm) generated by multi-self-frequency-conversion of the fundamental laser is up to 26.64 mW, and the light-light conversion efficiency is up to 4.85%. The lasers at 525 and 529 nm are very close to the green primary color G (526.3 nm) defined by the 1964CIERGB system, which has potential applications in laser-based high brightness display. The large frequency differences of 4-6 THz between 525 and 529 nm, 529 and 533.6 nm, as well as 1050 and 1069 nm, are also potential useful in generating THz waves by difference frequency generation (DFG) technique in a nonlinear optical (NLO) crystal.