



## **BIBO: New material for nonlinear frequency conversion applications**

The research led by the Optical Parametric Oscillators group at ICFO featured in Laser Focus World

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The work of the Optical Parametric Oscillators group is featured as a Newsbreak in the January 2005 edition of Laser Focus World. In this work, M. Ghotbi and Prof. M. Ebrahim-Zadeh at ICFO, together with collaborators from Poland demonstrate tunable femtosecond pulse generation in the blue at record average powers and conversion efficiencies using a new nonlinear material, BiB3O6.

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**Abstract:** We present studies of the optical properties of the new nonlinear material, for second harmonic generation from the visible to infrared. We discuss the phase-matching conditions and effective nonlinear coefficients in principal optical planes, acceptance bandwidths, spatial and temporal walk-off velocity dispersion and double phase-matching behaviour. We also report experimental studies in this material, where efficient, high-average-power resonant generation of femtosecond pulses into the blue is demonstrated. 1  $\mu$ s fundamental pulses at 76 MHz, single-pass second harmonic average power up to 1.00 mW at greater than 50% conversion efficiency have been generated in a tunable range of 375–435 nm. Using cross-correlation measurements in a  $\text{BaB}_2\text{O}_4$  crystal second harmonic pulse durations of 250 fs are obtained. Theoretical findings are verified by experimental data, where excellent agreement is observed.