

3.6 Efficient Frequency Doubling of a Master-oscillator Power-amplifier Laser Diode in KNbO₃

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A major drawback for efficient single-pass frequency doubling of single-mode single-frequency near-infrared laser diodes has been their limited power of <200mW. Recently, Spectra Diode Labs (SDL) developed a master oscillator power amplifier (MOPA) laser diode that provides an output power of up to 1W in a diffraction-limited beam.

Using a 750mW MOPA laser diode from SDL together with an optical isolator we demonstrated the generation of about 5mW of blue-green radiation at 491nm by single-pass second-harmonic generation in a 9.5mm long antireflection-coated KNbO₃ crystal. This is the power level typically required for laser sources used in optical data storage, xerography or spectroscopy. The blue-green output power was stable to $\pm 1\%$ over a period of more than six hours, and the noise level was smaller than $\pm 0.1\%$ (rms). A prototype compact blue-green laser was manufactured in our laboratory and is now available for further experiments and demonstration purposes.