3.5 Diode-Pumped 435 nm Laser Based on Sum-Frequency Generation in $KNbO_3$

(D. Fluck)

Efficient blue and blue-green light generation at ~430 nm and ~490 nm by frequency doubling of LDs in $KNbO_3$ has been reported for single-pass, resonant and waveguide configurations. Other wavelengths in the blue spectral range are readily accessible by sum-frequency generation. Using the nonlinear optical coefficient d_{32} of $KNbO_3$ tuneable blue light from 415 to 475 nm can be generated by noncritical type I phase-matched sum-frequency generation of radiation at wavelengths in the red (660 - 690 nm) and near infrared (770 - 1100 nm) spectral ranges which are covered by commercially available single-mode AlGaInP, AlGaAs and InGaAs laser diodes.

We demonstrated for the first time a tuneable continuous-wave diode-pumped blue laser by noncritical type I phase-matched sum-frequency mixing in a potassium niobate ($KNbO_3$) crystal. A maximum output power of 21 mW of diffraction limited sum-frequency radiation at 432.8 nm is generated in a 6.6 mm long crystal for mixing powers of 795 mW at 981.9 nm from a master-oscillator power-amplifier InGaAs laser diode and of 600 mW at 773.8 nm from an AlGaAs laser diode. The blue laser is continuously tuneable over the wavelength range from 431 to 438 nm.