

**Single frequency Nd:YLF ring laser in red emission using a ppKTP**

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We demonstrated a  $\pi$ -polarized single frequency cw Nd:YLF laser emitting in the red region. A 10mm-long Nd:YLF with 0.8at% of Nd<sup>3+</sup> doping was end pumped by a fiber coupled diode emitting in 806nm. We used an asymmetric bow-tie configuration with a fused silica thin etalon, with reflectivity of 25% to obtain single frequency operation. The unidirectional operation was maintained using a diode consisting of a Brewster-cut TGG Faraday rotator rod and a zero-order wave plate. Second harmonic generation was achieved using ppKTP chip mounted on a temperature controller and placed between the two curved mirrors (ROC=100mm). Due to the narrow spectral phase-matching bandwidth of ppKTP ( $\Delta\lambda_{QPM}=0.9\text{nm}$  FWHM for a 10mm long ppKTP), it was possible to observe a strong second-order nonlinear cascading process when the ppKTP was not operated in the phase-matching condition. In this situation, a broad-band emission was detected by the Fabry Perot cavity and the laser started to operate bi-directional with low circulating power. Without etalon, or with a less spectrally selective, uncoated one, the nonlinear cascading effects cannot be quenched and single longitudinal mode operation can never be achieved. Once we could match the ppKTP temperature operation and the wavelength of the laser, 1.3 W in the red emission (660.5nm) was achieved in single frequency operation and tuning range was  $\Delta\lambda_{IR} \sim 1.5\text{nm}$ . The laser remained stable with less than 1% fluctuation during one hour.