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Efficient blue light generation using periodically poled stoichiometric lithium tantalate via resonant frequency doubling[1] ALI KHADEMIAN, SHILPA JADHAV, DAVID SHINER, University of North Texas — Convenient high power blue diode lasers with single frequency operation are still under developments and are not as well developed and cost effective as IR laser sources. Harmonic generation of IR lasers provide a viable alternative source of blue and UV light. Magnesium oxide doped periodically poled Stoichiometric Lithium Tantalate (PPMgO:SLT) has been reported to have the lowest blue, IR and blue induced IR absorption (BLIIRA) among ferroelectric crystals such as Lithium Niobate (PPLN) and Potassium Titanyl Phosphate (PPKTP). All these properties, along with higher thermal conductivity, make this crystal an excellent candidate for efficient blue light generation using second harmonic generation (SHG) in a resonant buildup cavity. Efficient resonant doubling is very sensitive to various cavity and crystal loss mechanisms. Recently we obtained 400 mW of blue light at 486 nm with net conversion efficiency of 77% using a 515 mW fiber grating stabilized IR source. Sources of conversion loss have been identified and evaluated with various methods in our investigation. These include reflection, scattering, absorption, and polarization rotation of IR light in the crystal, as well as mode mismatching and spherical aberration due to focusing lenses. The locking and electronic control functions of the cavity are automated using an internally mounted single chip microcontroller with embedded DSP (digital signal processor).

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