Abstract Submitted
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Current work on developing more convenient single frequency blue and UV lasers using second harmonic generation.[1] ALI KHADEMIAN, Univ of North Texas, DAVID SHINER, University of North Texas — We have reported 81.5% efficiency in converting ˜600 mW of input IR to 486 nm output using a periodically poled Lithium Tantalate (PPSLT) crystal. A resonant IR enhancement cavity was used and conversion efficiency was high enough that impedance matching was possible with a 10% input coupler. The cavity had a total parasitic loss of 0.63%. Improving these results by identifying and minimizing various sources of loss can make this approach more widely applicable: for instance in the efficient conversion of input powers as low as a few mW or in the efficient conversion of wavelengths down to perhaps 300 nm. To this end we investigate the sources of our cavity loss. We find a 0.25% loss from polarization misalignment caused by the crystal. Also a 0.15% loss due to reflection from the periodically poled boundaries was measured. This refection also causes feedback to the IR source, leading to instability and mode hoping. We report on results using new PPSLT crystals with slightly tilted periodically poled slabs designed to eliminate the reflection loss mechanism and the feedback. We report on the polarization stability of these crystals, which have undergone a more careful annealing process. We have developed a sensitive technique to measure the total scattering and absorption loss within the crystals. Significantly, measurements on previous crystals indicated these losses to be negligible. We discuss this work and update the overall conversion efficiency.

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