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CO_2 Laser enhanced lifetime of femtosecond and nanosecond produced air plasmas JORGE MARTINEZ, CHARLEMAGNE AKPOVO, DAWN LEWIS, STACI BROWN, LEWIS JOHNSON, Florida A&M University — Air produced plasmas generated from a 20 mJ femtosecond pulse at 800 nm and a 5 mJ nanosecond pulse at 532 nm were orthogonally enhanced with a 3 J defocused CO_2 pulse to study the effect of interpulse delay on plasma lifetime. When interpulse delay was optimized with respect to the CO_2 pulse, both the femtosecond and nanosecond plasmas exhibited longer lifetimes. The impact of CO_2 laser pulse energy was explored by maintaining a fixed CO_2 laser fluence at the interaction point. The femtosecond/CO_2 combination exhibited the same relationship as with the defocused 3 J pulse with a substantial lengthening of plasma lifetime and luminance. The effect of the enhancing wavelength was studied by replacing the CO_2 laser with a 1064 nm nanosecond laser pulse to monitor any differences in the laser generated air plasmas. The femtosecond/nanosecond combination exhibited quenching of the generated plasma with almost no change in plasma lifetime. A study of these interactions will broaden the understanding of the role of pulse duration and wavelength when considering the phenomena that occur in laser generated plasmas such as inverse bremsstrahlung processes, multi-photon ionization, and collisional heating.

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