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Enhanced hohlraum radiation drive through reduction of wall losses with high-Z mixture 'cocktail' wall materials[1]

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Indirect drive efficiency for inertial confinement fusion depends to a large degree on the ability to mitigate wall losses in the hohlraum. One approach to do this is based on the use of hohlraum wall materials with overlapping absorption bands to absorb and re-emit the radiation that otherwise would be lost. Albedos and conversion efficiencies for various combinations of these materials, so–called cocktails, have been calculated and measured and a mixture of U, Dy and Au has been determined to be one of the best candidates. (A combination of U and Au will be used for the NIF ignition experiments). A series of experimental campaigns are performed at the Omega Laser Facility in Rochester to test the performance of cocktails-coated hohlraums versus pure Au hohlraums for radiation temperatures from 180eV to 310eV using 5kJ-20kJ of laser energy to drive well characterized hohlraums. The difference in soft x-ray drive is measured using a soft x-ray spectrometer (DANTE) in combination with backscatter measurements. Experimental results show significant improvement of hohlraum soft x-ray output by increasing the measured flux by up to 8% for the higher radiation temperatures in excellent agreement with analytical and modeling results. The results achieved at Omega will be discussed under the background of increasing the coupling efficiency during NIF ignition experiments through the use of high-Z cocktail walls.

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