

Comparisons of hafnia/silica anti-reflection coatings

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ABSTRACT

The Large Optics Coating Operation at Sandia National Laboratories routinely produces anti-reflection (AR) coatings for the large optics of the ZBacklighter lasers. The coatings are based on hafnia/silica layer pairs deposited by electron beam evaporation in Sandia's large optics coater. The AR performance requirements are at 1054 nm or 527 nm or dual wavelength at both 1054 nm and 527 nm, and at angles of incidence (AOIs) ranging from 0° to 45°. Some cases call for a low but not the lowest reflectivity achievable. All must exhibit high laser-induced damage thresholds (LIDTs). We have conducted reflectivity, design and laser damage comparisons of these AR coatings. Our reflectivity measurements are on Sandia's large optics reflectometer and compare the performance of a single AR design in a random selection of coating runs over 2 years, and also compare S and P polarization reflectivities of AR coatings at non normal AOIs. Our design comparisons are between designs for achievement of low versus very low AR in dual wavelength coatings at 1054 nm and 527 nm. And we compare the LIDTs of all of these AR coatings based tests using the NIF-MEL LIDT protocol.

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We report reflectivity, design and laser damage comparisons of AR coatings produced by Sandia's Large Optics Coating Operation for use at 1054 nm or 527 nm or for dual wavelength use at these wavelengths, and at angles of incidence in the range of 0° to 45°.