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Functional damage threshold of NIF and LMJ mirrors and polarizers at 1064 nm*

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Hafnia-silica multilayer mirror and polarizer coatings were tested at 1064 n m with a 3-ns-pulse. The laser-induced damage threshold was measured to determine the onset of damage. The effect of damage morphology on damage growth and on the performance of the optics were studied as a function of fluence and number of shots. Damage stability maps were constructed from the results in order to provide a quantitative method to describe the functionality of the optic. The maps show that for the four types of damage morphologies commonly found on the multilayers (i.e. pits, flat bottom pits, scalds, and delamination of the outer layer), delamination has to be eliminated since they represent a greater than 50% drop in polarizers' functional damage threshold. If the delamination problem can be solved, pit and flat bottom pit damage should then be controlled to reduce the risk of damage growth thereby limiting their potentially negative influence on the optic's functionality.

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