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A study of defects in HfO_2/SiO_2 multilayer coatings using photothermal microscopy*

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ABSTRACT

A photothermal microscope at 1064 nm with < 5 μm resolution was constructed for coating defect characterization by utilizing the photothermal lensing technique. This microscope coupled with an atomic force microscope enables us to examine both topological and thermal properties of coating defects. Damage threshold studies have revealed a correlation of laser damage and nodular defects. In some cases, damage sites also originate in coating areas free of nodular defects, yet do not correlate to the peak fluence of the test beam. This phenomenon suggests the presence of thermal defects. For this study, both nodular and thermal defects are characterized by photothermal and atomic force microscopy, damage tested, and reexamined with an optical and atomic force microscope to study the correlation between defects types and different damage morphologies.

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