Laser ablation of hafnium coatings

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The interaction of high-power laser radiation with a material is the subject of research by many scientific groups. This is due to the great practical significance of laser technologies in various fields of industry. For a number of years, the authors have been solving the problem of predicting the dynamics of destruction of materials under the influence of powerful laser pulses. The works [1–7] describe the methodology, experimental setup and research results. This paper presents the results of experiments on irradiation of hafnium dioxide coatings with high-power Nd^{3+}-YAG laser pulses at a wavelength of 1064 nm with energies up to the optical breakdown of the material. The duration of laser pulses varied from 20 ns to 300 μs. The studied samples consisted of a nanosized hafnium dioxide coating on a glass cover measuring 50×50 mm. The thickness of the coatings, according to the results of ellipsometric measurements, was 100±30 nm. According to the results of our measurements, the average value of the threshold energy density for a laser pulse duration of 20 ns was $F_{0.5} = 3.57 \pm 0.39$ J·cm^{-2} and for a pulse duration of 300 μs $F_{0.5} = 45.11 \pm 4.39$ J·cm^{-2}.

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