Advancing Silica Laser Damage: Broadband Enhancement via Ultrafast Laser Nanostructuring

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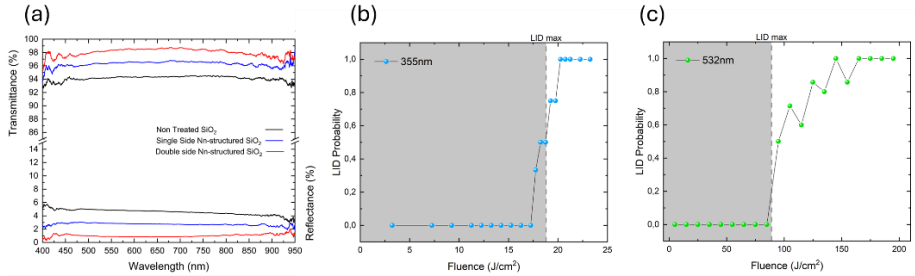
This study explores the broadband enhancement of laser-induced damage threshold (LIDT) on silica optical flats induced by femtosecond laser pulses [1]. The process generates surface nanostructures, specifically random pillars, leading to a significant increase in transmission across a wide spectral range Fig.1(a). Testing the nanotextured silica surfaces revealed notably higher LIDT at 355 nm and 532 nm wavelengths of irradiation as depicted in Fig.1(b),(c), surpassing those of the original substrates. Experimental observations demonstrated a broadband enhancement in laser-induced damage, particularly noticeable with single few-nanosecond laser pulses across three test wavelengths at different regions UV, VIS, and IR, indicating increased LIDT. These findings offer valuable insights into LIDT on nanostructured surfaces [2], [3], [4]. This research holds potential implications for optics, telecommunications, and paves the way for the development of laser-induced materials processing with customizable optical resistance.



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