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Spatial Frequency Modulated Imaging of Real-Time Laser-Matter Interaction[1] CLARE LANAGHAN, Iowa State University, JEFF SQUIER, NATHAN WORTS, Colorado School of Mines — Laser modification of materials or biological systems would benefit from imaging systems that are able to quantify interactions in real-time. One important requirement of such an imaging system is to be robust against optical scattering, as interactions may take place deep within a scattering material. We demonstrate a new imaging modality that enables real-time characterization of laser ablation from a 10.6m CO_2 laser. Our system uses confocal spatial frequency modulation imaging with a rotated reticle modulation mask to show real-time changes with two and three dimensional images. Single element detection is used to aid in mitigating scattering effects, and an 800nm excitation wavelength enables detection down to millimeter depths in glass and plastic. The resolution of the system was tested by imaging line-pairs down to 20μm. The contrast in images taken of a fingerprint on acrylic and microfluidic channels in glass, which are both essentially phase targets, suggests that the system is capable of generating contrast based on phase differences. We are working on new models of the microscope to help explain the apparent phase contrast.

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