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Response of graphene to intense optical irradiation ADAM ROBERTS, College of Optical Science, University of Arizona, COLLIN REYNOLDS, DANIEL HEMMER, BRIAN LEROY, ARVINDER SANDHU, Department of Physics, University of Arizona — We investigate the modification of graphene under intense ultrashort laser irradiation. Our observations indicate that the graphene structure is very resilient and exhibits a high damage threshold, which is promising for high order non-linear applications. In the case of epitaxially grown samples, we find that single-shot damage threshold is $5 \times 10^{10} \text{Wcm}^{-2}$ for 50 fs pulse duration. Raman and optical microscopy measurements of irradiated samples show that the carbon lattice completely disappears from the region where the laser intensity exceeds the threshold without leaving any visual or spectroscopic signature. Below the threshold, single-shot irradiation does not exhibit a significant defect formation. However, repeated laser irradiation below the threshold leads to formation of defects. The mechanisms underlying the defect formation and lattice reduction will be discussed.

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