

Influence of organic contamination on laser induced damage of PVD mirrors by subpicosecond laser pulses

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Laser induced damage of optical components is often a limiting factor for the development of high power lasers. Indeed, for many years organic contamination is identified as a factor decreasing the Laser Induced Damage Threshold of optical surfaces, limiting the use of high fluences. Also, for the development of its laser facilities, Laser MégaJoule and PETAL, the Commissariat à l'énergie atomique et aux énergies alternatives investigates the influence of organic contamination on the optical performances of its components. Actually, although a great care is provided on the cleanliness of the optics, organic volatile compounds outgassed from surrounding materials may be adsorbed on the sensitive surfaces during their lifetime. Thus, for this study, multilayer dielectric mirrors are intentionally contaminated by qualified protocols to compare their performances with clean components. Identification and quantification of the organic contamination is realized by automated thermal desorption and gas chromatography coupled with mass spectrometry. Laser induced damage threshold of clean and contaminated mirrors are then investigated by a 670 fs laser pulses at 1053 nm.