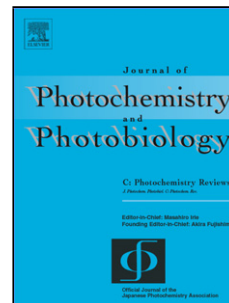


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Multiple ionization and Coulomb explosion of molecules, molecular complexes,
clusters and solid surfaces

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HIGHLIGHTS

Molecular structure determinations by Coulomb explosion imaging are reviewed

Intact multiply charged molecular cation productions are summarized

Contribution of electrostatic interactions behind the ablation of solid materials is introduced

Abstract

Intense femtosecond lasers as well as X-ray free electron lasers provide new means to produce multiply charged molecular cations. The fragmentation processes that these high energy species undergo, termed Coulomb explosion, are utilized to determine the static molecular structures as well as to trace the molecular dynamics of ultrafast chemical reactions. This review focuses on recent advances made in studies of Coulomb explosion imaging, highlighting the use of this process to determine the static structures of complex molecules, geometric isomers, chiral molecules and molecular complexes. Briefly, we summarize the recent time-resolved studies of surface electric fields and the controversy

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