

Abstract Submitted
for the DPP08 Meeting of
The American Physical Society

Interactions of clusters with X-ray free electron laser YUJI FUKUDA, TATSUFUMI NAKAMURA, KENGO MORIBAYASHI, Japan Atomic Energy Agency, YASUAKI KISHIMOTO, Kyoto university — In order to investigate the damage of a single bio-molecule when it is irradiated by a strong X-ray free electron laser (XFEL) pulse, time evolution of a single carbon cluster with diameter of 30 nm irradiated with 10-fs XFEL pulse is studied by using particle-in-cell (PIC) code including field-ionization and collisional ionization. The cluster is ionized up to C^{4+} within a femtosecond from the surface by strong sheath fields ($\sim TV/m$). Then, the cluster is gradually ionized to higher charge states by collisional ionization. Target size and XFEL pulse intensity have an effect on ionization processes due to the change of sheath field intensity. This result indicates that the field ionization by strong sheath field plays an important role to the damage of a single bio-molecule.

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Date submitted: 15 Sep 2008

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