

Abstract Submitted
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Vacancy cascades in small molecules following x-ray inner shell photoionization¹ D. RAY, Lawrence Berkeley National Laboratory, R.W. DUNFORD, S.H. SOUTHWORTH, E.P. KANTER, G. DOUMY, Y. GAO, P.J. HO, A. PICON, Argonne National Laboratory — We are investigating molecular effects in vacancy cascades of small molecules containing heavy atoms - IBr, Br₂ and CH₂BrI - following K-shell ionization. In addition to fundamental interest in the physics of such decay processes, there are practical applications such as medical treatments that use energetic fragmentation of iodinated compounds with high energy x-rays to selectively treat tumorous cells. Other biological applications are also promising. We utilize the tunable monochromatic x-ray beam at the Advanced Photon Source to trigger K-shell photoionization of Br and I, and measure charge distributions and the kinetic energies released to the fragment ions. A newly designed detection device allows us to do multi-fold coincidence measurements involving momentum imaging of all the ion fragments with very high detection efficiency in coincidence with x-ray fluorescence detection. By comparing the molecular fragmentation probabilities and the kinetic energies released in Br₂, IBr and CH₂BrI we aim to gain understanding of the fragmentation mechanism as a function of the bond distance between I and Br.

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