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# Electron emission from uracil and bromouracil at Bragg peak energy

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The secondary electron emission from nucleobases and water is an important topic in the contemporary atomic collision physics. Highly charged ion induced ionization, radical emission following fragmentation are important mechanisms in the study of radiation-damage which will have applications in case of hadron therapy. In the present study, the collision energies are made to vary across the Bragg energy loss peak. By using a tandem 14 MV accelerator and an ECR source on a 400 kV deck. In particular the angular distribution and angular asymmetry in the electron double differential cross sections and total ionization cross section for uracil molecule provide some crucial inputs regarding the many-body aspects and also a test of the theoretical models. In the context of tumor cells exposed to high energy ion beams, radio-sensitizers (high atomic number nnoparticles, e.g.) are well known reagents used to increase the killing efficiency of malignant cells. Further, the radiosensitizing properties of halouracils is a subject of theoretical and experimental investigations. Several work have been carried out with halouracils, particularly in studying the fragment products . However, a quantitative study of the enhancement of the electron intensity due to the presence of a nanoparticle in DNA base molecule is missing. In order to get a quantitative estimate of the enhancement we have made complimentary measurements using bromouracil as a target. The details of the energy and angular distributions of the electron emission have been studied using 42 MeV bare C-ions. Unusually large enhancement in e-emission particularly in low energy region (0-50 eV) from the high-Z based BrU molecule has been noticed for all angles. The derived absolute cross sections are compared against a number of theoretical models such as CB1 and CDW-EIS. The studies on involve HCIs of C, O, F and Si of varieties of energy ~keV/u -MeV/u. The detailed data for these molecules has been used to develop a scaling rule of ionization in terms of velocity and charge states, which will have input for the model calculation for radiation damage at hadron therapy. Inclusion of transfer-ionization mechanism improves the agreement with a suitable scaled model. The investigations are carried out using ToF as well as e-spectroscopy based measurements.

Some recent references:

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