

Measurement of Auger electrons emitted after nuclear decay: the case of ^{125}I

M. Vos,¹ M. Alotiby,¹ T. Kibédi,² Pi Tee,² and I. Gregoric³

¹*Electronics Materials Engineering, The Australian National University, ACT 0200, Australia*

²*Department of Nuclear Physics, The Australian National University, ACT 0200, Australia*

³*Australian Nuclear Science and Technology Organisation, Lucas Heights, NSW, Australia*

During certain nuclear decay processes inner shell electrons are removed. In these cases the atom will relax from its initial, highly-excited state by emission of a number of X-rays and Auger electrons. Within the context of medical physics the Auger electrons are of particular interest as they deposit their energy in the close proximity of the emitting atom which could form the basis of targeted cancer therapy. Hence there is renewed interest in quantifying the number of Auger electrons emitted after nuclear decay. ^{125}I is used here as a case study, as it emits large quantities of Auger electrons and can be prepared as a monolayer source on a Au substrate which is stable for exposure to air.

For ^{125}I the energy of the Auger electrons varies from ≈ 25 keV to a few eV and quantitative measurement of their intensity is an experimental challenge, requiring a good understanding of the detector efficiencies [1]. We will present spectra taken with two spectrometers, that cover the whole range of energies and discuss how to derive from the measurement the number of Auger intensity emitted per nuclear decay and their energy distribution. A comparison is made with calculations using the BrIccEmiss [2] model for isolated atoms and the influence of the Au substrate on the emitted intensity and observed line shapes is discussed.

[1] M. Alotiby, I. Gregoric, T. Kibédi, B. Lee, M. Roberts, A. Stuchbery, Pi Tee, T. Tornyi, and M. Vos, *Physics in Medicine & Biology* **63**, 06NT04 (2018).

[2] B. Lee, H. Nikjoo, J. Ekman, P. Jönsson, A. E. Stuchbery, and T. Kibédi, *Int. J. Radiat. Biol.* **92**, 641 (2016).