Testing the K, L Shell Fluorescence Yield and Coster-Kronig Coefficients from EADL with EGS5 Monte Carlo System

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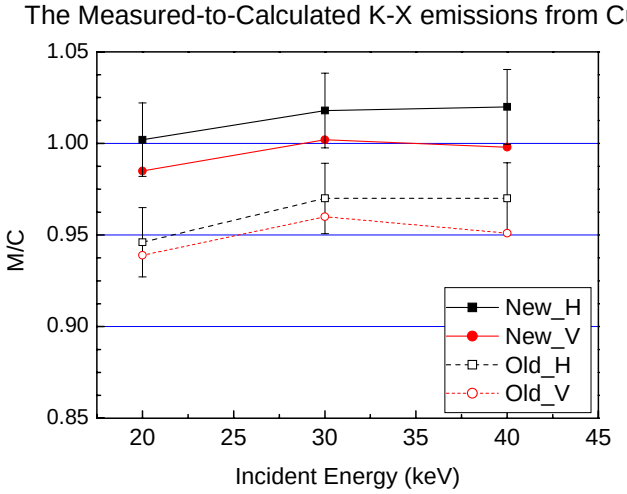
During the recent years, the low-energy photons transport, compared with measurements, became one of the most detailed processes in the EGS4 Monte Carlo code for X-rays simulations.
Several routines were added to the code in order to simulate low-energy photons. Tabulated data was required in addition to the new routines, such as the X-rays and the Auger electrons energies and their transmission rates. The latest data in use was adopted from *The Table of Isotopes eighth edition* (Firestone and Shirley, The Table of Isotopes, Wiley 1996). Since the fluorescence and Coster-Kronig yields from the Table of Isotopes were taken from several previous sources, it became reasonable to inspect these yields with a more updated database.
In this work, we report the results of the fluorescence yields comparisons performed between the data from The Table of Isotopes and the new data from the Livermore Evaluated Atomic Data Library – EADL (Perkins and Cullen 1994). From a wide view of all elements, it was found that the newly library showed more detailed yields, correspondent to the sub-shell structure versus the atomic number.
The EADL data, in general, showed several percents difference in comparison with the previously used data and in some points the difference was tremendous.
The updated database in EGS5 was tested and compared to previous simulation results for K-X-rays emission spectra of copper and iron targets. The total counts of each fluorescence emission was calculated using EGS5 and was compared with experimental measurements results (Namito, Hirayama, KEK proc. 2005-3 2005) for polarized photon beams with incident energies of 20, 30 and 40 keV. The use of EADL database for atomic fluorescence X-rays emission in the simulations, improved the matching between measured-to-calculated counts ratios.



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