Win X-ray, The Monte Carlo Program for X-ray Microanalysis in the Scanning Electron Microscope

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The computation of characteristic lines as well as the bremstrahlung allows to improve the accuracy of x-ray microanalysis in the scanning electron microscope (SEM) using an energy dispersive spectrometer (EDS). This entitles not only to model background's shape for the extraction of net X-ray intensity, but also to predict peak to background ratios and delectability limits of an element in a given system. Also, the magnitude of fluorescence correction from the absorption of characteristic lines and the bremstrallung can be computed from simulated X-ray spectra. Finally, new ways to perform quantitative analysis could be developed since the total background intensity is function of specimen's composition.

In this paper, a new Monte Carlo program that computes the full X-ray spectrum, measured with an EDS detector in a SEM is described. This program, named Win X-ray, is based on the simulation of electron scattering in solids using the Monte Carlo method. This technique is described by Hovington et al.[1] for X-ray microanalysis in the SEM. The complete details of this program are given in the paper of Gauvin et al.[2]. Win X-ray have been designed to simulate the full X-ray spectra (the characteristic lines and the bremsstrahlung) for homogeneous alloys or compounds for any angles of the incident electron beam and the X-ray detector axis relative to the specimen normal. Also, this program computes absolute X-ray intensities in order to simulate real experimental conditions for incident electron energies ranging from 1 to 40 keV. This program also computes the complete X-ray spectrum of a non conductive material using the model described by Hendrix et al.[3] .The Monte Carlo program Win X-ray can be downloaded for free at www.minmet.mcgill.ca/MonteCarlo. Figure [1] shows the window interface of Win X-ray.

References

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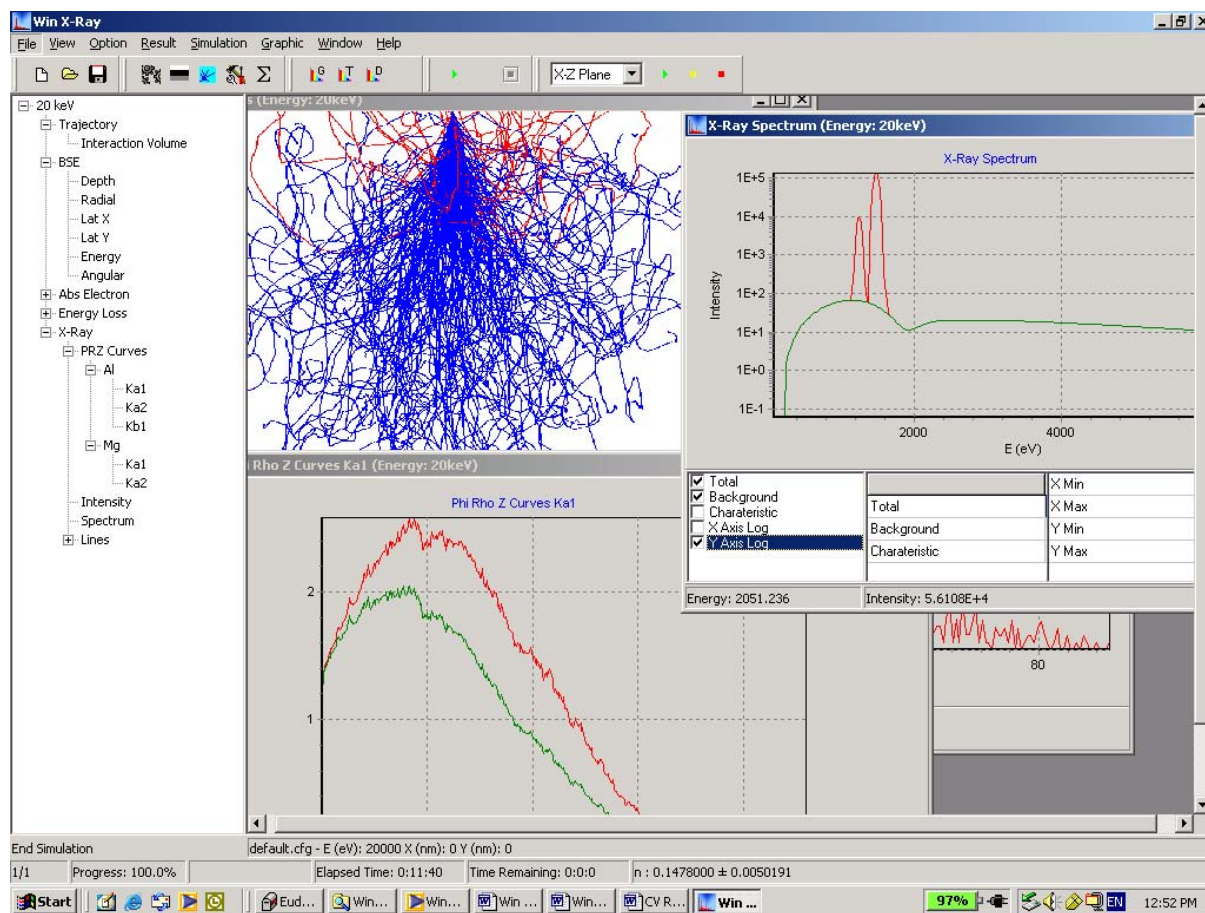
Figure [1] Window interface of the Win X-ray Monte Carlo program.