# FITTING THE BACKGROUND CURVE ON THE SPECTRA OF X-RAY MICROANALYSIS OF MINERALS

DATSYUK, YU. & FOURMAN, V.
Chair of Physics of Earth, Faculty of Geology, L'viv National University; Hrushevskogo str., 4, 79005 L'viv, Ukraine
E-mail: yudat@ukr.net

We present the results of the development of a computer based peak/background ratio technique for quantitative X-ray microanalysis.

The energy dispersive X-ray microanalysis is a successful method due to its rapidness and relative simplicity. The standard ZAF technique is a complicated procedure, requiring special preparation of the samples and usage of external standards. However, the peak/background technique is an outstanding one because it considers the spectra as a whole *i.e.* treats the peaks and the background as single complex formation. Moreover, the peak/background technique is less dependent on the effects of fluorescence and secondary absorption. This new technique is basically a computer simulation of the spectrum followed by successive cycles of iteration aiming to minimize the difference between the calculated and observed spectrum.

According to our approach the background curve consists of two parts i) a lognormal curve, which describes background emission free of absorption and ii) the components that are responsible for the absorption edge and described by staircase functions. The fitted spectrum consists of a convolution of Gaussians, lognormal functions and staircase functions. The parameters of both the background curves and Gaussian peaks are treated with the least-squares method, in order to minimize the difference between empirical and the calculated functions.

Experimental studies have been performed using a JEOL scanning electron microscope equipped with an energy dispersive spectrometer of the Oxford Instruments Analytical. Results by our iterative calculation method demonstrate reliable coincidence with the standard based EDAX methods.

The goals of the proposed technique is to extend the potential of X-ray microanalysis to samples that cannot be studied by standard EDAX methods and to those for which no reliable standard can be found (*e.g.* due to special chemistry). Our technique allows to increase both the accuracy and sensitivity of the X-ray microanalysis of such samples and more efficient in precise measurements and analysis of rough and/or not prepared samples.

**References**

GOLDSTEIN, J., NEWBURY, D.E., JOY, D.C., LYMAN, C.E., ECHLIN, P., LIFSHIN, E., SAWYER, L.C. & MICHAEL, J.R. (1981): Scanning electron microscopy and X-ray microanalysis. New York: Plenum Press.

STATHAM, P.J. (2002): In: Proceedings NIST-MAS Special Topics Workshop "Understanding the Accuracy Barrier in Quantitative Electron Probe Microanalysis and the Role of Standards" NIST, Gaithersburg, MD, USA, April 8–11.