# Professor Mikuláš Matherny and his Košice Spectroscopy School: History and Scientific Milestones

Karol Flórián

Technical University of Košice, Faculty of Metallurgy, Institute of Recycling Technologies, Letná 9, 042 00 Košice, Slovakia, e-mail: Karol.Florian@tuke.sk

Professor Mikuláš Matherny (full professor since 1982) moved from Bratislava to Košice in 1960. Having some experience in spectroscopy, at the early times of his stay at TU he established a working group, later well known as "Košice spectroscopy school". In spite of the fact that Košice was the centre of magnesite industry at that time, the main interest of analytical chemists was oriented towards natural materials mainly in the form of powdered samples. As spectrography was at that time one of the leading instrumental analytical methods, logically this method was preferred. The first published papers were devoted to basic problems of spectrography: the influence of quality of spectral electrodes on excitation process was checked, as well as the possibilities of spectrographic analysis of magnesite and later of CaO-matrices. Besides these typical analyses of powdered samples (today´s solid sampling), appropriate interest was paid also to the solution methods of the analysis. The basic problem of both solution and powder spectroscopy was the phenomenon designated as matrix-effect. This was described and clearly defined by prof. Matherny and a complex procedure for checking of this effect in spectrography was evaluated. In spite of the fact that quantitative spectrochemical analysis was based since Gerlach´s proposal on the use of spectral line pairs (analytical-X vs. reference-R line), the examination of their correlation has become of high importance. The method of scatter diagrams proposed by Holdt, Strasheim and Keddy was applied by prof. Matherny and his school in various spectrographic methods. Including two further parameters to the mentioned correlation-regression analysis of spectral line pairs, the complex method for checking the homology of spectral line pairs was established, using an own computer program for this evaluation (used at that time also by other spectrographic groups not only in Slovakia, but also in Hungary). Later, besides modernized instrumentation, the evaluation process has also been changed – the systematic use of statistical methods as well as of own computer programs in evaluation are typical. Summarizing papers about the use of computers in spectrographic evaluation as well as about determination of limiting criteria in spectrography were published by prof. Matherny and his co-workers. The weak points of quantitative spectrography at that time were both the measurement of densities on the photographic spectral plates and their transformation process. The determination of transformation constants ($\gamma$ and $\kappa$) of used $\ell$-transformation as well as the transformation of densities using tables was very difficult and laborious. Therefore computer programs were developed and their reliability was tested. Another alternative method (for powdered samples of environmental origin), the double arc method was applied in Slovak-German cooperation as a result of Professor Matherny´s stay in the Research Centre in Jülich / Germany as visiting professor (research group headed by prof. Hubertus Nickel). In environmental applications, the gravitation dust sediments were analysed and evaluated using chemometrical procedures in cooperation with the F. Schiller University in Jena, but the methodology and possible chemometrical investigations in environmental analysis in general were also described. This research had a continuation in comparison of solid sampling spectrochemical methods by means of multivariate statistics and information theory which was realized in German-Slovak-Hungarian cooperation using the evaluation procedure based on the information characteristics, elaborated by prof. Matherny. The fruitful scientific career of prof. Matherny ended in June 2015. This was also the time when the research in the scientific field of chemistry as well as the PhD study programmes in analytical chemistry were stopped at the Faculty of Metallurgy. As a result of these facts it seems that the Košice spectroscopic school established by prof. Matherny reached its end.