

XMF 104 X-ray Micro Analyser

X-Ray Characterisation of Ferro Alloys

Introduction

Compositional characterization is of great importance in alloy metallurgy. This application notes highlights the utility of Unisantis XMF—104 X-Ray Microanalyser for such an application. In this study, micro beam x-ray quantitative elemental analysis has been carried out on several types of ferroalloys. Such a study was possible due to the intensely focused x-ray beam of very small diameter which is very essential for such applications. The optical lay out of the equipment is given in Fig 1. X-ray spectra were obtained on five types of ferroalloys namely, Ferro- Molybdenum, Ferro-Titanium, Ferro-Phosphorous, Ferro-Silicon, Ferro-Vanadium. The material were from a company supplying raw materials for metallurgy and foundry. The samples were analysed using a Molybdenum tube. The operating voltage current were 30kV and 50 mA. Each sample was measured for 300 seconds.

The EDXRF spectra obtained for these samples are given in Figs 2 to 6.

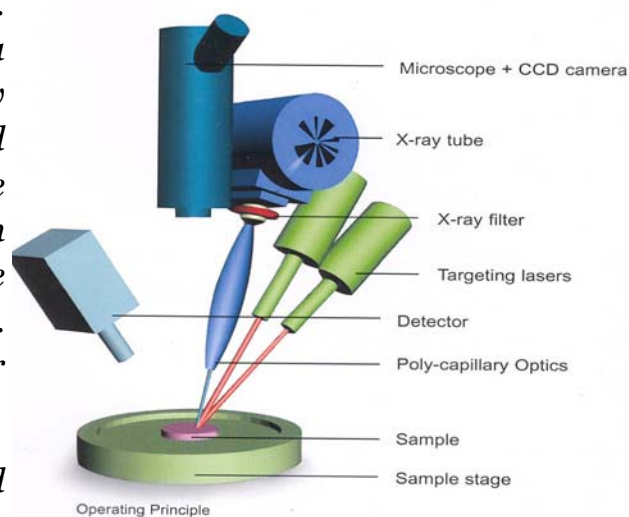


Fig 1. Optical lay out of Unisantis XMF—104 Micro Analyser

Application Note: 603

In association with Institute for Roentgen Optics, Moscow

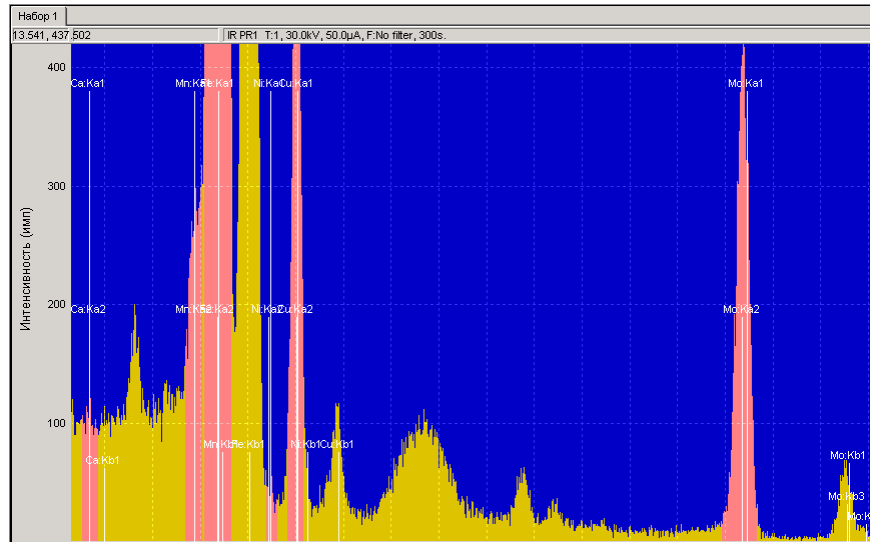


Fig 2. Micro EDXRF spectrum of Ferro-molybdenum

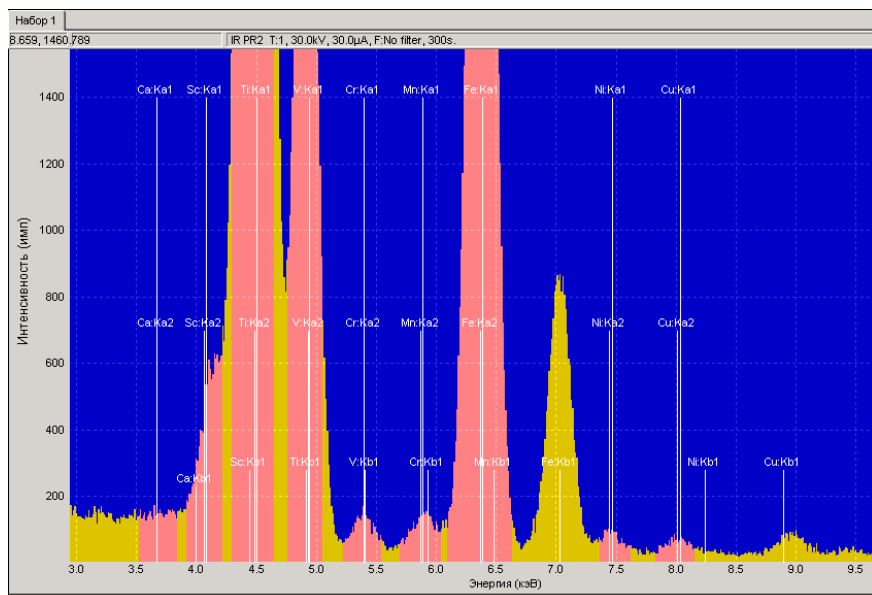


Fig 3. Micro EDXRF spectrum of Ferro-titanium

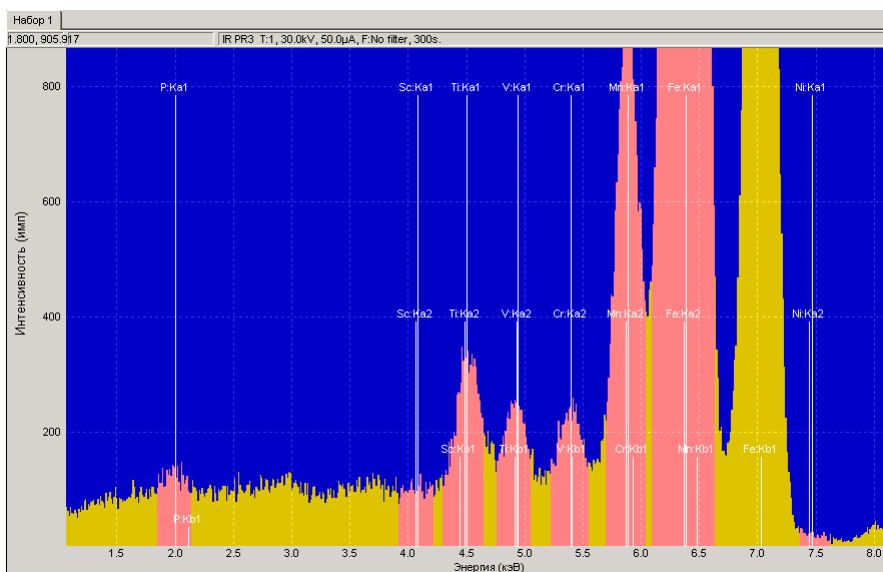


Fig 4. Micro EDXRF spectrum of Ferro-phosphorous

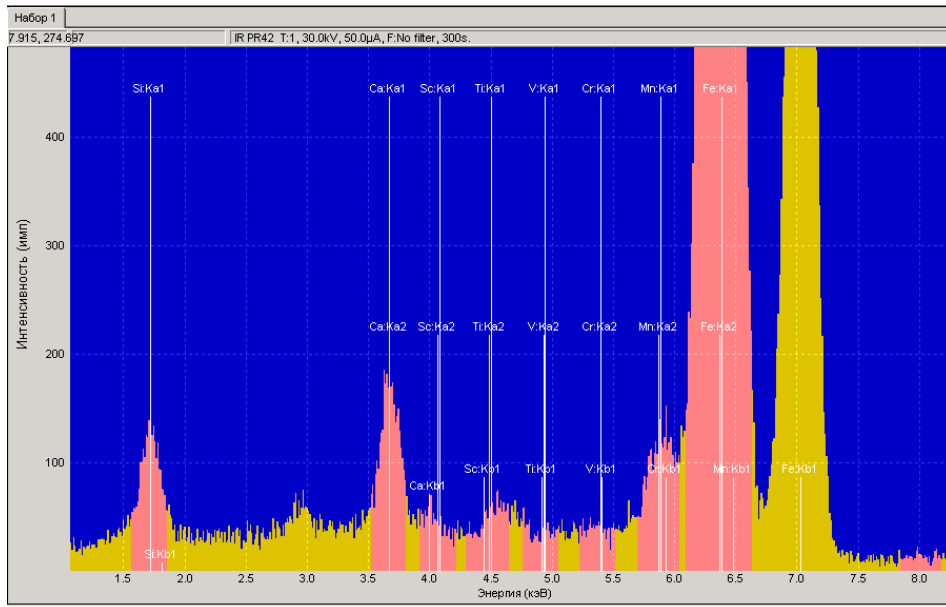


Fig 5. Micro EDXRF spectrum of Ferro-silicon

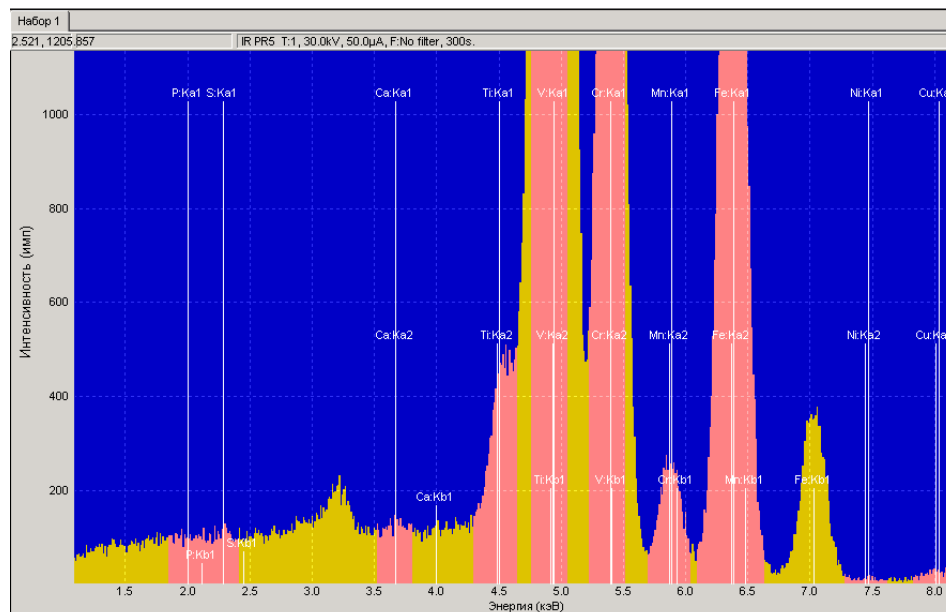


Fig 6. Micro EDXRF spectrum of Ferro-vanadium

Results and Discussion

The analysis was carried out at the Institute for Roentgen Optics by A.S. Shcherbakov.

The elements present in the sample were quantitatively determined using Fundamental Parameters approach. The abundance of various elements identified in the samples are listed in Table 1, given in the next page.

	SAMPLE- 1	SAMPLE -2	SAMPLE- 3	SAMPLE -4	SAMPLE- 5
Fe %	75.36	25.2	85.34	16.91%	15.68
Mo%	22.07	---	---	---	---
Ti%	---	73.47	0.57	0.03	
P%	---	---	12.31	---	0.84
Si%	---	---	---	81.00	---
V%	---	0.79	0.14	0.01	79.03
Ca%	0.01	0.01	---	1.90	0.13
Mn%	0.11	0.23	1.38	0.08	1.20
Ni%	0.04	0.08	0.01	---	0.01
Cr%	---	0.03	0.2	<0.01	0.48
Cu%	2.37	0.12	---	0.01	0.07
Sc%	---	0.08	0.04	---	---
S%	---	---	---	0.02	2.21

Table 1. Quantitative XRF elemental analysis of ferroalloys

The above study amply illustrates the utility of Unisantis XMF –104 for such metal-lurgical alloy studies .

Unisantis S.A. is a global leader in the development and manufacture of innovative X-ray analytical instrumentation, complete solutions and software for structure and elemental analysis using proprietary Kumakhov optics known for best beam collimation. Success in research has enabled Unisantis S.A. to develop new cutting -edge X-ray technology, applications and products for the market. Our products have particular applications in material characterization, life science and industrial analysis.

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