

## ELECTRON PROBE MICROANALYSIS AND ITS APPLICATION FOR ANALYTICAL DETERMINATION OF PHOSPHORUS

*Electron probe X-ray microanalysis (EPMA) has been used to determine the content of phosphorus in the ferroalloys and the iron master alloys. This analytical method is useful for the express determination of phosphorus and has several advantages if compared with the well-known colorimetric method, which is achieved by adjusting the standard substance, the latter is used to keep the matrix effect. It has been determined that standards for the quantitative determination of phosphorus by EPMA should be homogeneous on the distribution of phosphorus in their volume, should have a clearly defined stoichiometry and should be characterized by high stability on the impact of high-energy electrons. These standards could be vitreous or crystalline; however, they should possess sufficient hardness and fracture toughness. The last determine the conditions of standards polishing, which is a technological operation that should be performed in order to minimize the influence of the surface topography on the results of microanalysis. These conditions, among the investigated materials, is the best suited to the plates of single crystal synthetic monazite  $CePO_4$ , which is a typical representative of the final stoichiometric number of mineralogical row and belongs to a broad family of refractory thermostable complex transition metal oxides. It is shown that the express WDS-EPMA method in the presence of an appropriate standard allows analytical determination of phosphorus in ferroalloys and ligatures and has significant advantage over spectrophotometric methods due to the rapid and nondestructive testing of alloys composition. Satisfactory agreement between the results of analysis that is conducted by using the WDS-EPMA method and standard spectrophotometric method confirms these data validity. The WDS-EPMA method has sufficient accuracy and shows reproducibility of the measurements. By using the WDS-EPMA method, 0.04-0.15 wt. % of phosphorus can be determined in the industrial ferroalloys. The data obtained allowed to apply this analytical technique for express analysis of trace phosphorus in industrial ferroalloys and the iron master alloys in order to control their production grade.*

*Key words: electron probe X-ray microanalysis, express analysis, determination of phosphorus.*