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Application News

No.P98

Electron Probe Microanalyzer

Microanalysis Using the EMPA-8050G

Introduction

In recent years, along with progress in nanotechnology, a variety of industrial goods have become miniaturized, reduced in quantities, and made more precise. Since all manufactured products consist of substances existing on earth, where resources are limited, materials development is being progressed with the objective of reducing their consumption, particularly with respect to limited resources such as rare metals. Under these situations, the creation of nanoparticles of the materials used has also progressed, which has required high-resolution and high-sensitivity analysis in microscopic regions.
The CeB6-EPMA, which has become very popular recently, is capable of high-sensitivity and high-resolution image observations and element analysis (See Application News P94). Here, we introduce a sample analysis with the FE-EPMA, which is capable of analyzing even more microscopic regions.

Platinum in Ceramics

Ceramic catalysts with precious metals supported by oxides are well known. Among precious metals, platinum (Pt) is particularly valuable. It is not very reactive itself, but causes other substances to interact. However, platinum deposits on the earth are very small, so techniques have been devised to reduce its consumption in recent years. In catalytic development, important themes are the microminiaturization of platinum particles and the establishment of high-efficiency dispersion methods.
Fig. 1 shows images of platinum particles on the order of several dozen nm in size, of which dispersiveness is evaluated via elemental mapping analysis, using the EPMA-8050G (FE-EPMA).

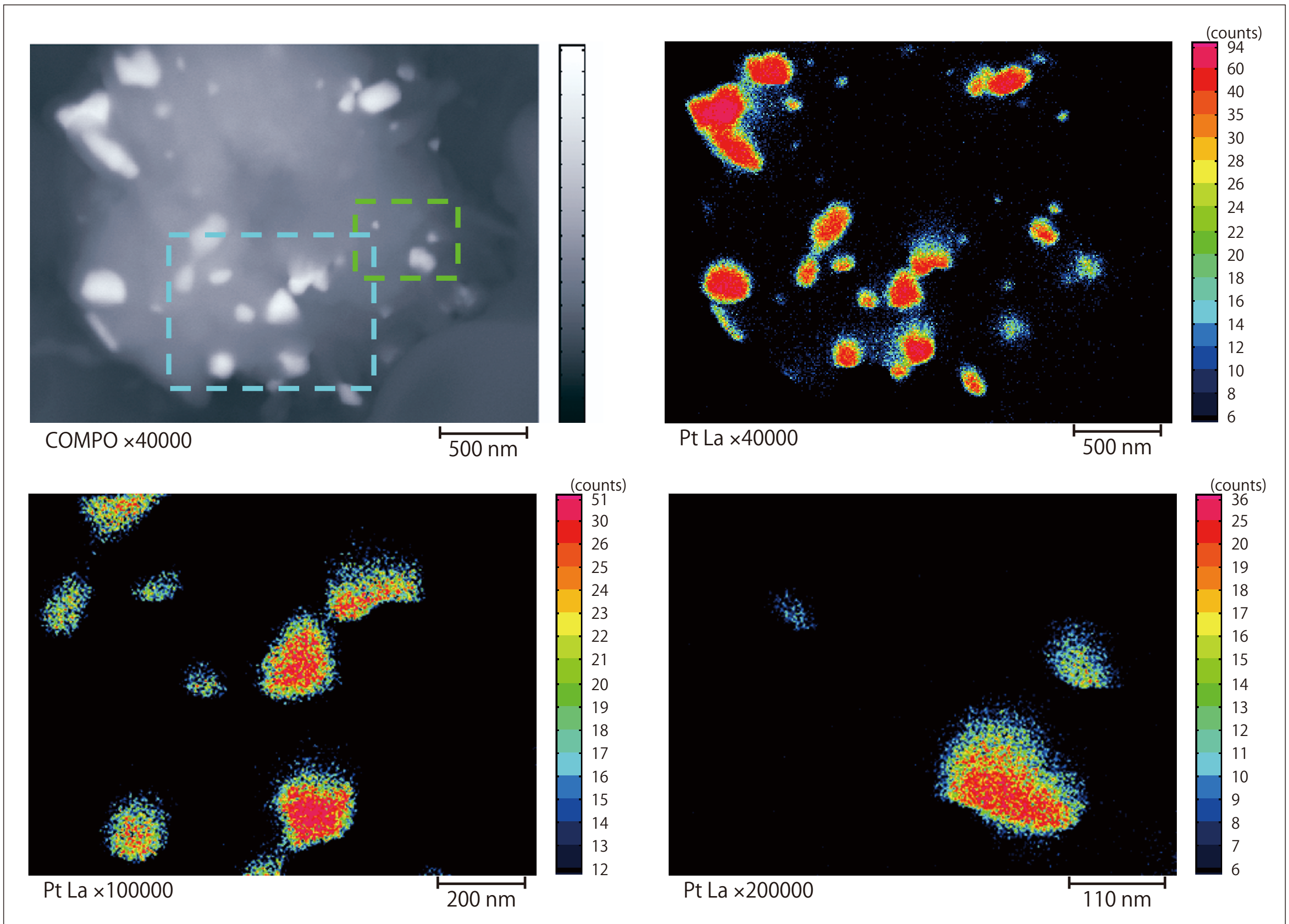

Fig. 1 Platinum Elemental Mapping

Nonmetallic Inclusions in Steel

When creating steel, sulfides, silicate oxides, nitrides, carbides and other substances may remain from the fusion and refinement process, precipitate from changes in solubility in the cooling and solidification process, or precipitate during the steel heat treatment process. These are referred to collectively as nonmetallic inclusions. Depending on the components comprising the steel, crystal grains are made smaller by hot working, and carbides, nitrides and other fine particles precipitate, improving the material properties.

In this way, the investigation of micronized nonmetallic inclusions and precipitates in steel is very important for understanding the properties of the steel, and high-sensitivity and high-resolution analysis is a necessity.
In the elemental mapping data in Fig. 2, the distribution of sulfide nonmetallic inclusions can be confirmed with a high degree of sensitivity, while in the elemental mapping data in Fig. 3, the existence of inclusions on the order of several dozen nm in size can be confirmed with a high degree of resolution.

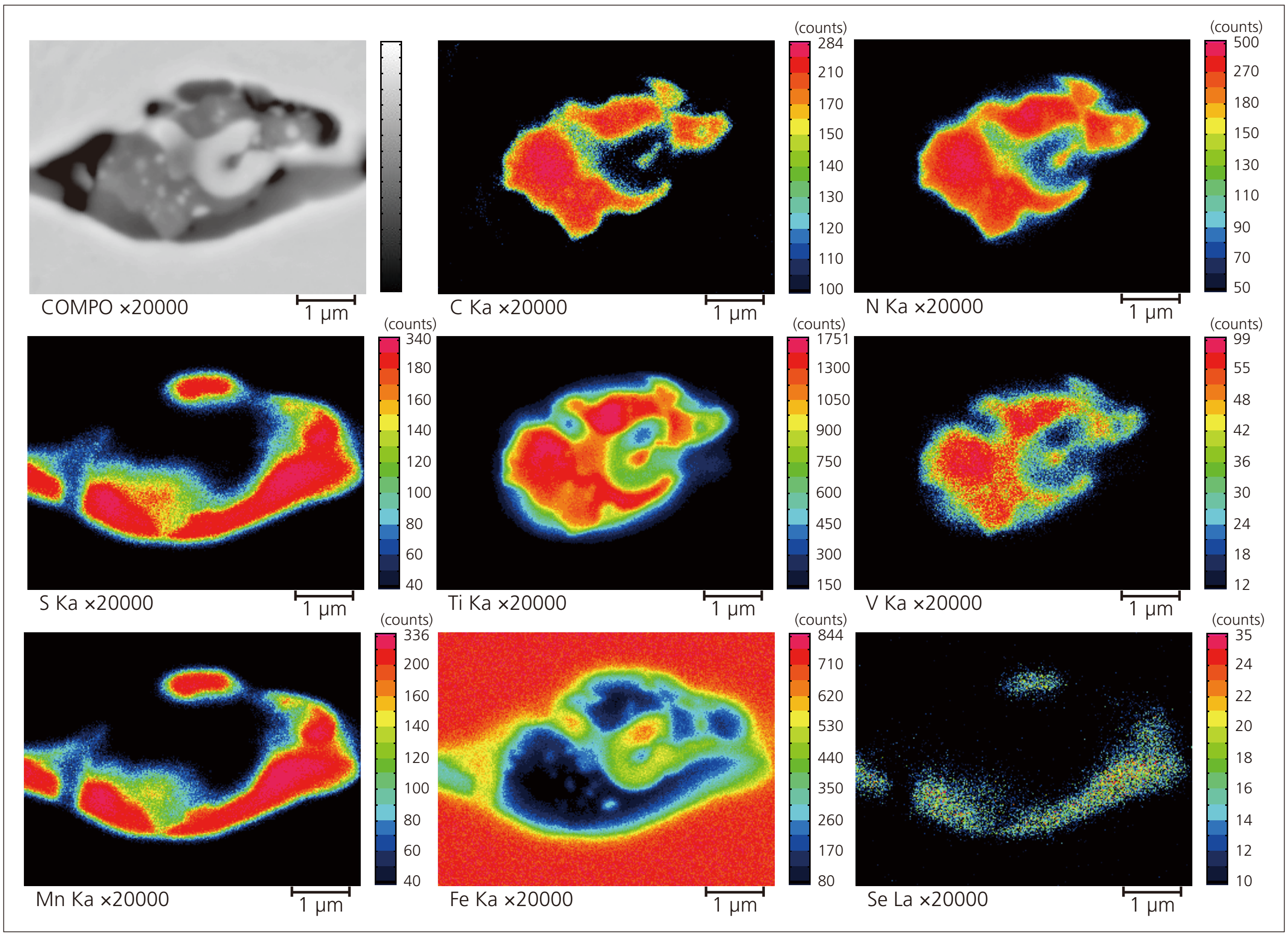

Fig. 2 Elemental Mapping of Nonmetallic Inclusions

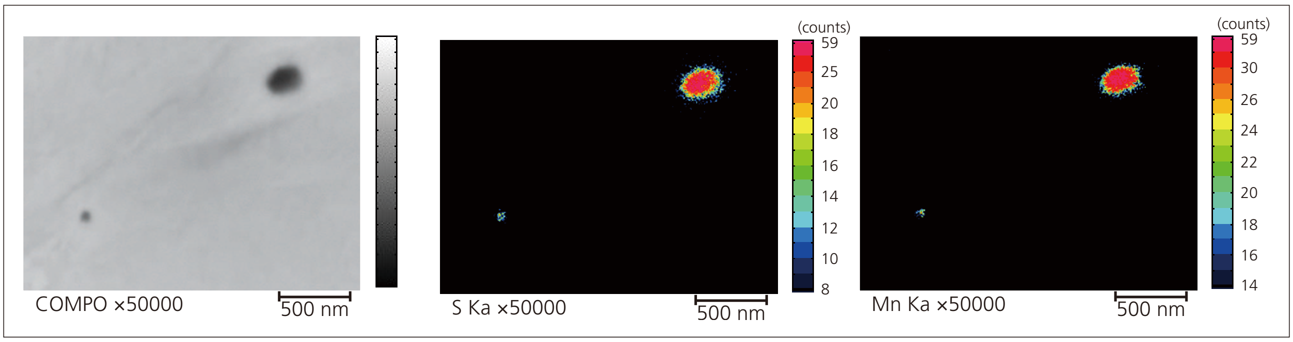

Fig. 3 Elemental Mapping of Inclusions

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