

Metrology informatics on semiconductor materials

Shigetaka Tomiya, Nara Institute of Science and Technology

Materials Informatics is a method of exploring and designing new materials using data-driven science. For this purpose, optimizing materials fabrication processes and processing methods for data measurement and analysis are also indispensable. In recent years, it has come to be called process informatics and metrology informatics.

Material properties and device characteristics depend highly on the fabrication method, i.e., "process." Therefore, it is necessary to add process conditions in addition to the correlation between physical properties and structure (composition and device configuration). Measurement and analysis are essential to grasp changes in materials due to processes. Therefore, the key is extracting valuable and extensive information from the acquired data.

It is essential to accurately capture material changes caused by process conditions in process development, and quantitative measurement data is required. Using informatics methods will become increasingly important to extract more information from measurement data than ever.

In this talk, after describing the importance of metrology informatics from the viewpoint of so-called RX (research transformation), we will introduce examples of metrology informatics mainly related to semiconductors, including our studies, such as the dry etching process of GaN and composition fluctuations of InGaN ternary alloys by using transmission electron microscopy and the related spectroscopy.