Microscopic Analyses of Static Random Access Memory

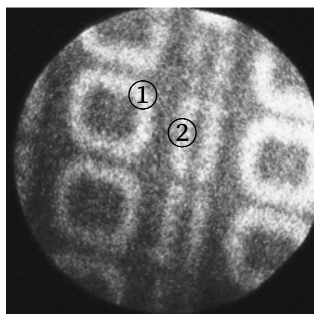
Junichi Tsuji[1], Hiroaki Miyata[1], Manabu Fujita[1], Hideki Hashimoto[1], Fang-Zhun Guo[2], Toyohiko Kinoshita[2]

[1]*Toray Research Center, Inc., 3-3-7 Sonoyama, Otsu-city, Shiga, 520-8567 Japan*
[2]*Japan Synchrotron Radiation Research Institute, 1-1-1 Kouto, Sayo-cho, Sayo-gun, Hyogo, 679-6158 Japan*

Next generation semiconductor materials have been developed rapidly in electronics device industry. With the development of micro-fabrication technology of new device materials, analytical techniques that can provide more detailed information on chemical structure as well as material composition from a specific and small area of devices have been strongly required. In order to improve device characteristics, it is very important to obtain such information, especially concerning the chemical bonding of Cu wiring or interface of multi-layer films.

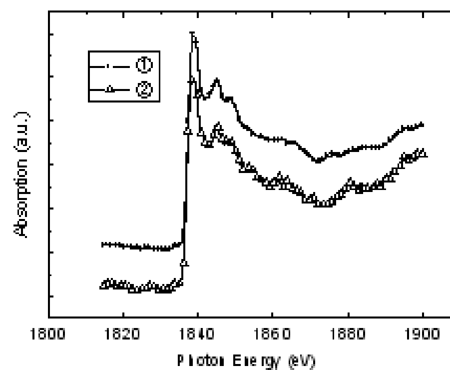
PEEM (Photoelectron Emission Microscope), a surface microscope with the spatial resolution of less than 50 nm, can be applied to various spectroscopic analyses such as XPS (X-ray Photoelectron Spectroscopy) or XAFS (X-ray Absorption Fine Structure) spectroscopy at small area of sub-micron to nanometer order, including the atomic imaging analysis at the top-surface area. A high brilliance synchrotron radiation facility such as SPring-8 in Japan is promising as the excited sources for these purposes.

In this study, a SRAM (Static Random Access Memory) device equipped in a commercial personal computer was used after removing Cu wiring and other multi-layered. PEEM analysis was carried out at BL17SU on SPring-8 in Japan. A PEEM image and Si-*K* XANES spectra of SRAM are shown in Figure. Application of the microscopic analysis using PEEM and other method was instituted for SRAM.



$2\ \mu m$

(a) PEEM image.



(b) Si-*K* XANES spectra at sub-micro area.

Figure. Micro spectroscopy of SRAM.