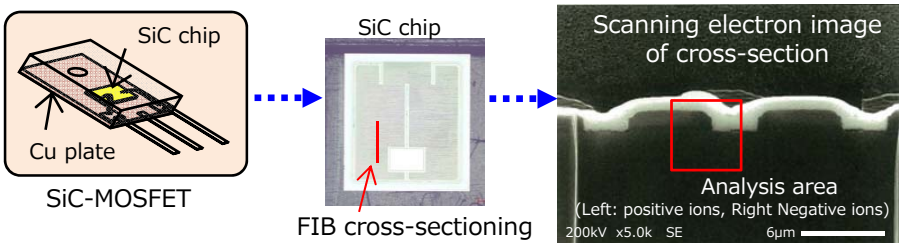
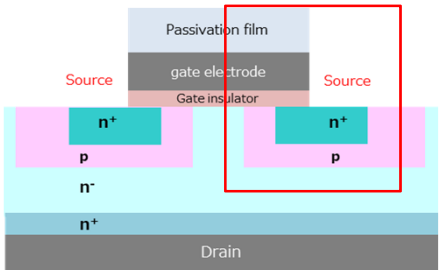
NanoSIMS elemental analysis for cross-section of SiC-MOSFET

The NanoSIMS 50L can provide the highest lateral resolution among secondary ion mass spectrometers and can simultaneously achieve high sensitivity and high mass resolution. Here, we introduce cross-section analysis of SiC-MOSFET using NanoSIMS and TEM-EDX.

Cross-section image of SiC-MOSFET



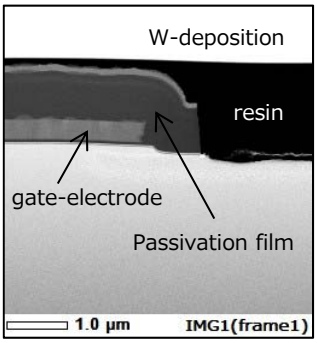
A cross-section of SiC-MOSFET was prepared by FIB, after wet-etching of resins and electrodes on the SiC chip.



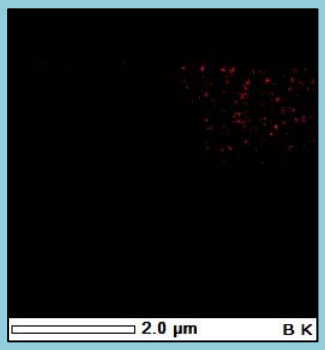
Schematic diagram of SiC-MOSFET

Elemental analysis of SiC-MOSFET by TEM-EDX and NanoSIMS

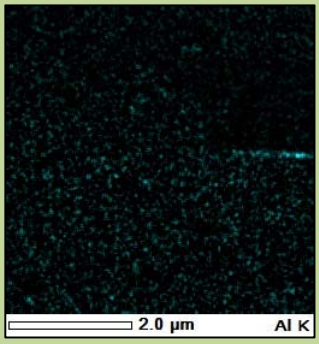
HAADF-STEM Image



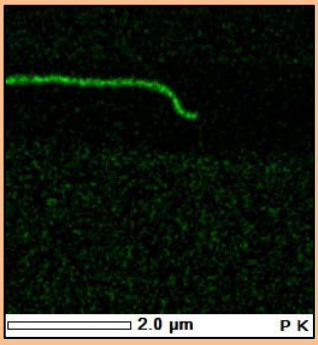
Boron



Aluminum

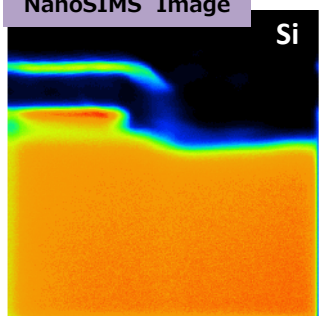


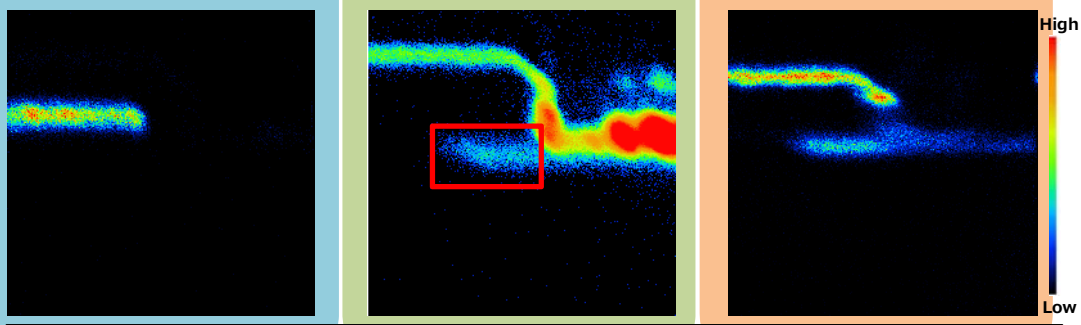
Phosphorus



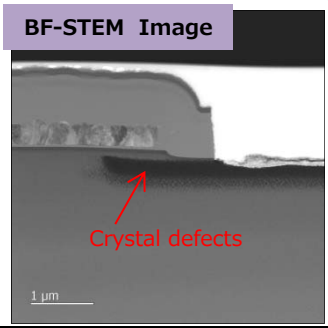
Boron in the gate electrode, Aluminum in the p-well and Phosphorus in the n^+ region were NOT detected.

NanoSIMS Image





BF-STEM Image



The image of each impurity in these regions is clearly captured.

The Aluminum ion image surrounded by the red frame is in good agreement with the shape of the implantation defects observed in the BF-STEM image in the left figure.

With high sensitivity and high spatial resolution, NanoSIMS can evaluate dopant and impurity distributions that can NOT be detected by TEM-EDX.