Development of high-definition infrared color night-vision imaging technology

Clear high-definition color video recording of objects in darkness

We have developed 3CCD full high-definition (HD) infrared color night-vision imaging technology. Infrared night-vision cameras are used widely to record images in darkness, but for a long time only monochromatic images have been available. In fields where night-vision recording is indispensable (e.g. security, on-board vehicle cameras, and nocturnal wildlife observations), HD cameras are beginning to be used to collect detailed image information, but still as monochromatic images. If color images that are similar to those under visible light can be recorded by using only infrared light, then information that is qualitatively different from that currently available can be obtained and new developments in the above-mentioned and other fields can be expected.

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The newly developed HD infrared color night-vision camera
The black rectangular block on top of the camera is the infrared projector.

Example of images of objects taken in darkness by using the newly developed infrared color night-vision camera

Analysis of trace light elements with X-ray absorption fine structure

Nano-structure of an SiC semiconductor revealed by a superconductor

A trace amount of light elements are indispensable for functional materials or devices. Nitrogen is a typical donor dopant for a compound semiconductor, SiC. However, doping into SiC is very difficult compared with monoatomic Si, and thus it is still one of the difficulties for realizing energy-saving semiconductor devices. A lack of nano-structure analyzing method for trace light elements was prohibiting green innovation. Here, we report a new instrument using superconductivity and successful lattice site determination of the nitrogen dopant implanted in SiC.

X-ray absorption fine structure spectra at the nitrogen K-edge were measured by using a superconducting X-ray detector that enables to separate the weak N-*K* line from the strong C-*K* line. Comparison between the experiment and first-principle calculation revealed that the nitrogen atoms occupy the C sites.

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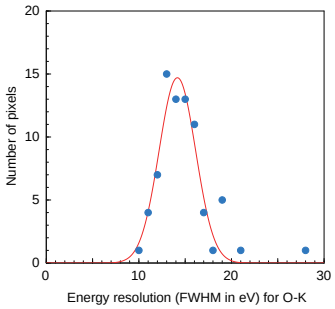
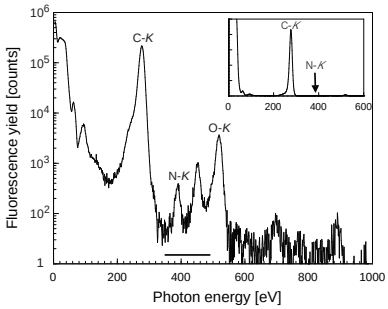


Pixel number distribution of energy resolution for the oxygen *K* line (525 eV)



An example of the detection of trace nitrogen dopant atoms in SiC