Research Hotline

UPDATE FROM THE CUTTING EDGE

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The abstracts of the recent research information appearing in Vol.13 No.7-9 of "AIST TODAY" are introduced here, classified by research areas.
For inquiry about the full article, please contact the author via e-mail.

Environment and Energy

250 °C switching operation of diamond power diode
Next generation power semiconductor device for energy savings

Diamond is receiving much attention due to its outstanding properties as a power semiconductor material. We have been leading the field of diamond semiconductors from 2005. Recently, we have developed a high performance power Schottky barrier diode (SBD) made of diamond. p type SBD of vertical structure operating up to 1 ampere was developed and mounted in a refractory metal-ceramic type package which can operate in temperatures up to 250 °C. As the device is a "Schottky type" majority carrier device, it can operate at high speed and low loss. Additionally, it can operate at 250 °C that permits the new concept of "cooling system free" operation due to diamond characteritics. We have tested its switching characteristics by using the "double pulse method," and confirmed excellent operation from room temperature up to 250 °C, and also confirmed fast switching of 15 nsec and 60 nJ low loss operation.

For the next step, we are to develop a low defect epitaxial growth technique associated with low defect diamond wafers to confirm actual use over 100 amperes operation.

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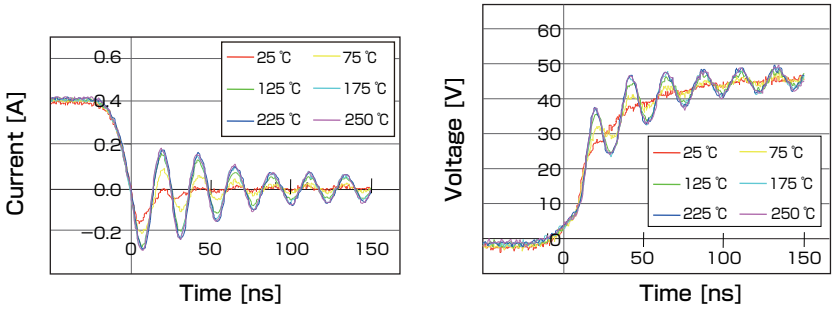

Switching operation of SBD from room temperature up to 250 °C