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FIVE reasons why SiC is HOT

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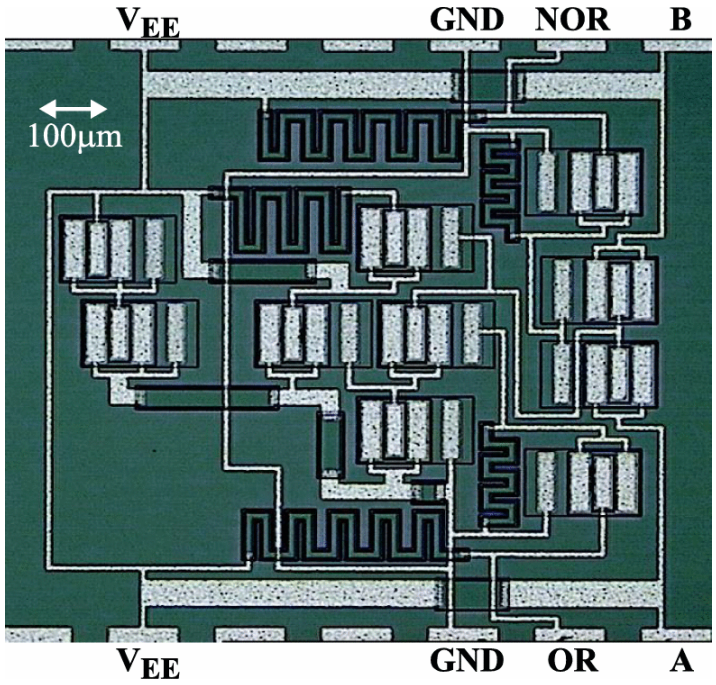
Reason 1 why SiC is HOT

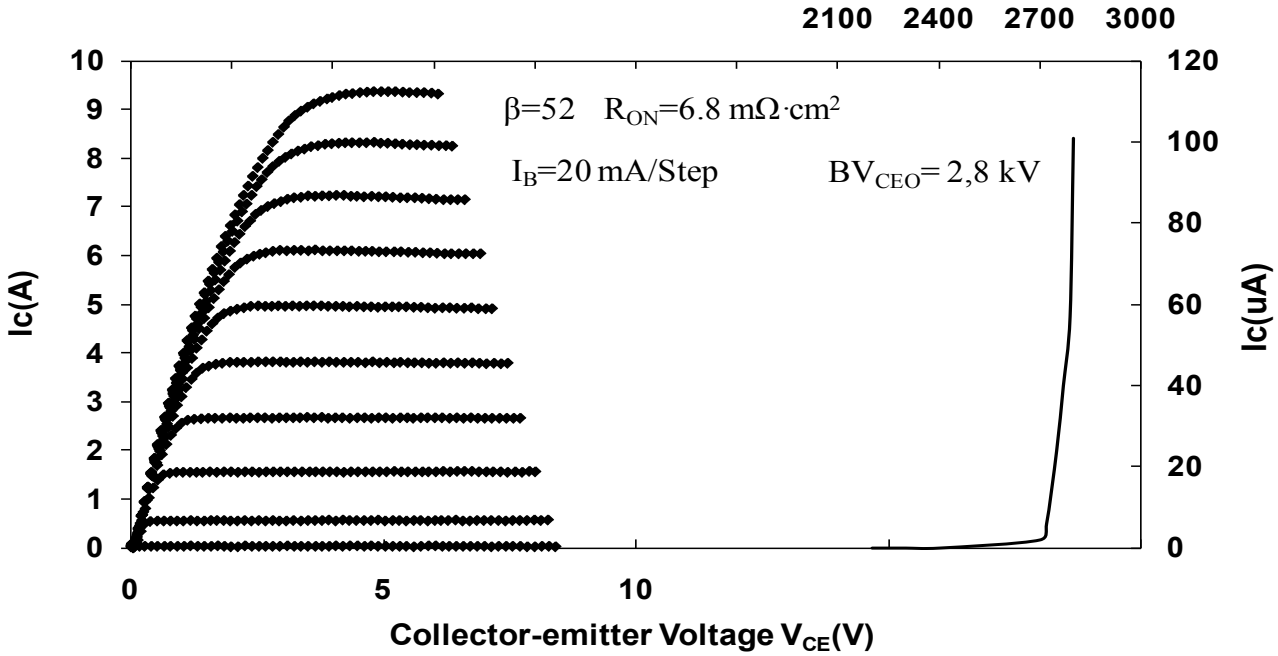
SiC Integrated Circuits can work even at temperatures of 500 °C



500 °C Bipolar Integrated OR/NOR Gate in 4H-SiC, Lanni, L., Malm, B.G., Östling, M., and Zetterling, C.-M., IEEE Electron Device Letters, vol. 34, p. 1091, 2013. http://dx.doi.org/10.1109/LED.2013.2272649

Reason 2 why SiC is HOT

SiC high voltage switches (> 1 kV) operate with the lowest ON-resistance

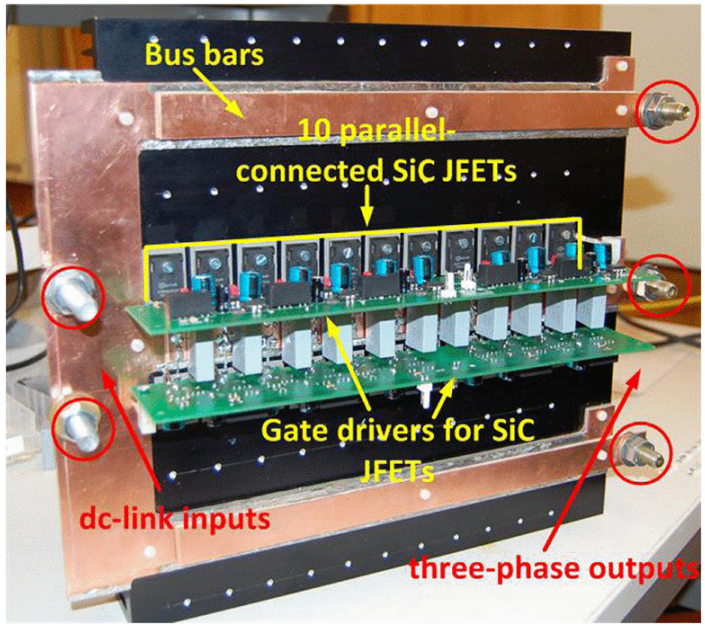


High-Voltage (2.8 kV) Implantation-Free 4H-SiC BJTs With Long-Term Stability of the Current Gain, Ghandi, R., Buono, B., Domeij, M., Zetterling, C.-M., and Östling, M., IEEE Trans. Electron Devices, vol. 58, p. 2665, 2011. http://dx.doi.org/10.1109/TED.2011.2154332

(actually makes SiC COOLER…)

Reason 3 why SiC is HOT

SiC converters can be designed for higher frequencies and lower losses

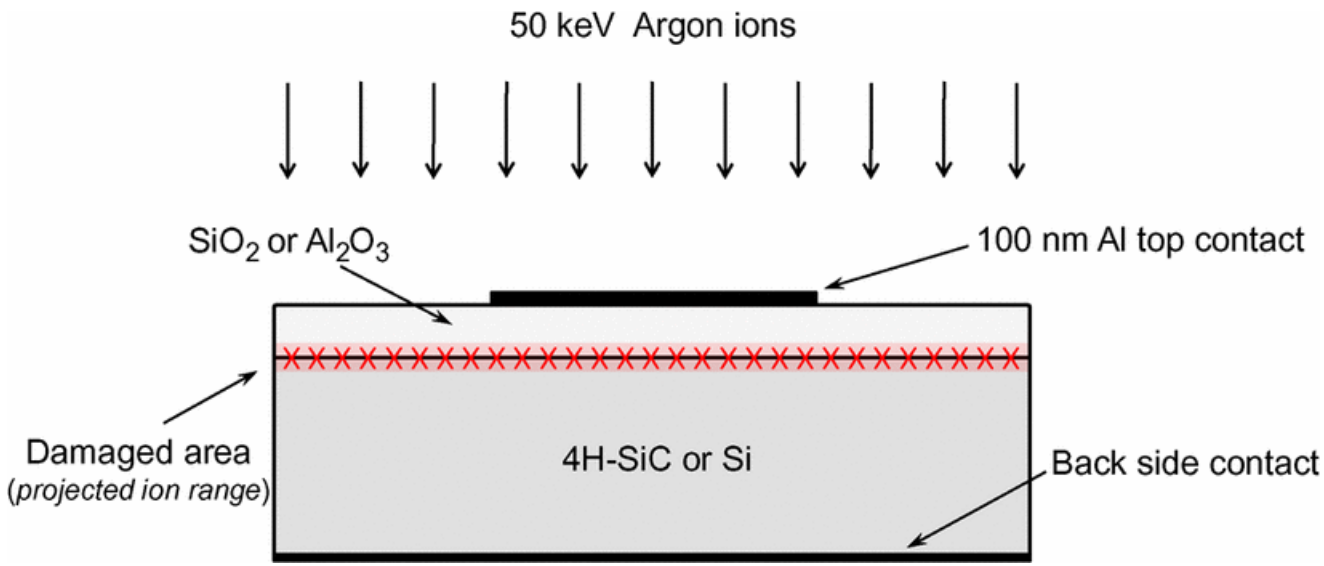


Design Steps Toward a 40-kVA SiC JFET Inverter With Natural-Convection Cooling and an Efficiency Exceeding 99.5%, Rabkowski, J., Peftitsis, D., and Nee, H.-P., IEEE Tran. Industry Applications, vol. 49, p. 1589, 2013. http://dx.doi.org/10.1109/TIA.2013.2258132

(actually makes SiC COOLER…)

Reason 4 why SiC is HOT

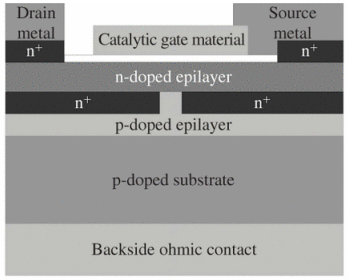
SiC devices can handle harsh environments



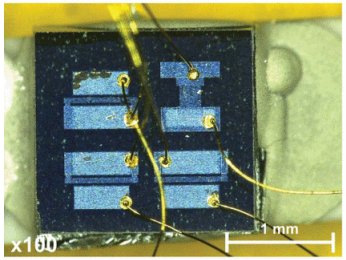
Radiation-Hard Dielectrics for 4H–SiC: A Comparison Between SiO_2 and Al_2O_3, Usman, M. and Hallen, A., IEEE Electron Device Letters, vol. 32, p. 1653, 2011. http://dx.doi.org/10.1109/LED.2011.2166992

Reason 5 why SiC is HOT

SiC sensors can go places where other sensors don't survive



(a)



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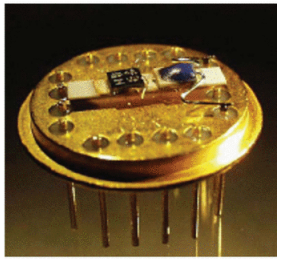

(c)

Increasing the Selectivity of Pt-Gate SiC Field Effect Gas Sensors by Dynamic Temperature Modulation, Bur, C., Reimann, P., Andersson, M., Schutze, A., and Spetz, A.L., IEEE Sensors Journal, vol. 12, p. 1906, 2012. http://dx.doi.org/10.1109/JSEN.2011.2179645

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Other reasons why SiC is HOT

- 150 mm wafers commercially available
- > 20 years of device research
- Commercial devices and modules from several suppliers:
  CREE, Fairchild, GeneSiC, Infineon, IXYS, Rohm, ST Microelectronics
- Applications in Aerospace, Nuclear Energy, Oil- and Gas Drilling, Geothermal