

# **Electrical and thermal conductivities of porous SiC/SiO<sub>2</sub>/C composites with different morphology from carbonized wood**

## **Abstract**

Porous SiC/SiO<sub>2</sub>/C composites exhibiting a wide range of high thermal and electrical conductivities were developed from carbonized wood infiltrated with SiO<sub>2</sub>. As a pre-treatment, the samples were either heated at 100 °C or kept at room temperature followed by sintering in the temperature range 1200–1800 °C. The microstructure, the morphology, and the electrical and thermal conductivities of the composites were investigated. Pre-treatment at room temperature followed by sintering up to 1800 °C produced composites exhibiting a greater size of carbon crystallites, a higher ordering of the microstructure of carbon and β-SiC and a smaller amount of SiO<sub>2</sub>, resulting in electrical and thermal conductivities of  $1.17 \times 10^4 \Omega^{-1} \text{ m}^{-1}$  and 25 W/mK, respectively. The thermal conductivity could be further improved to 101 W/mK by increasing the density of the composite to 1.82 g/cm<sup>3</sup>. In contrast, the pre-treatment at 100 °C produced composites possessing a lower thermal conductivity of 2 W/mK.