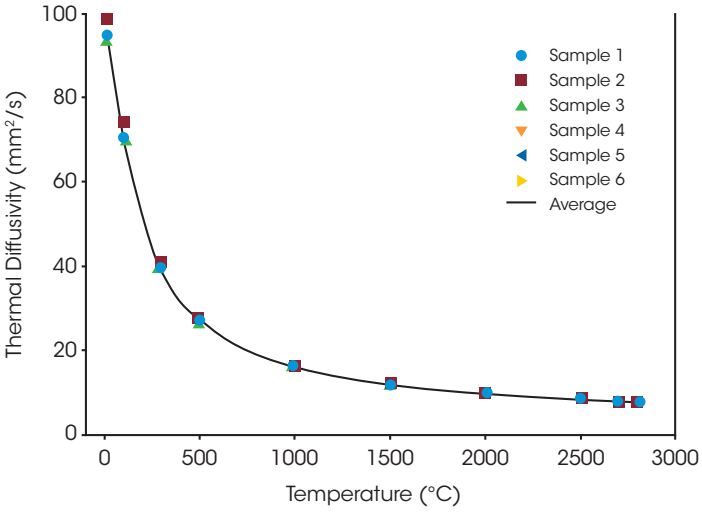
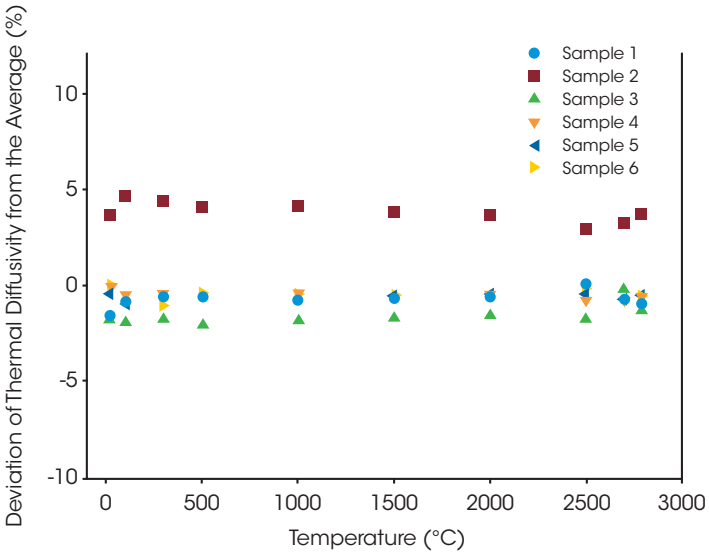
Thermal Diffusivity Measurements on Graphite up to 2800 °C

TPP028

Graphite materials have been used across a wide range of industries such as environmental, energy, electronics, metallurgical, and aerospace. Their basic applications within these industries include large-scale furnaces and ultra-high temperature heaters. Isotropic graphite is one material that is commonly used for high temperature applications. The high thermal diffusivity/conductivity of isotropic graphite combined with low thermal expansion result in the optimum high-temperature material that has excellent heat distribution and thermal shock resistance with low thermal deformation.

In order to characterize the heat distribution performance and thermal shock resistance, the evaluation and statistical study of thermal diffusivity on each graphite product would need to be performed. Uniformity of samples within lot-to-lot, block-to-block, rod-to-rod, and piece-to-piece are very important for both fabrication research and quality control. This application note contains the results of Laser Flash diffusivity measurements on six samples from three different lots of isotropic graphite lots all conducted within a single DLF 2800 test.





Instrument	
DLF 2800	
Test Conditions	
Temperature Range	Room temperature - 2800 °C
Sample holder	six-position graphite carousel
Sample size	12.7 mm dia. and 3.18 mm thick
Atmosphere	Argon

RESULTS

Sample 1 is from a purified isotropic graphite rod. Samples 3-6 are from another purified isotropic rod, but a different rod from Sample 1. All of these sample are in very good agreement (within ~2%). Sample 2 is from a third rod of unpurified isotropic graphite which explains the difference in diffusivity value compared to the other samples. Even so, the thermal diffusivity values are only 4 - 5% higher than the other purified graphite samples. The DLF 2800 allows for the concurrent testing on six samples under completely identical conditions which provides a reliable and efficient statistical study.

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