

APPLICATION SHEET

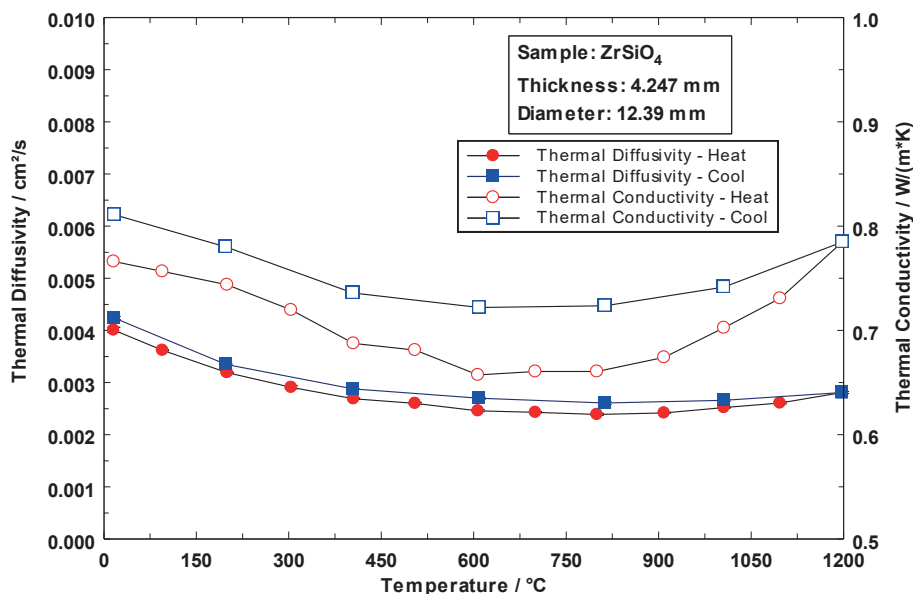
Inorganics · Ceramics
LFA 427

Zirconium Silicate $ZrSiO_4$

Introduction

Zirconium silicate is a mineral belonging to the group of nesosilicates. Its chemical formula is $ZrSiO_4$. The crystal structure of zirconium silicate is tetragonal crystal class. The natural color of zirconium silicates varies between colorless, yellow-golden, red, brown or green. Colorless specimens that show gem quality are a popular substitute for diamond; these specimens are also known as "Matura

diamond" (but note that cubic zirconia is a completely different synthetic mineral with a different chemical composition). Commercially, zirconium silicates are mined for the metal zirconium which is used for abrasive and insulating purposes. It is the source of zirconium oxide, one of the most refractory materials known. Crucibles of ZrO_2 are used to fuse platinum at temperatures in excess of $1755^\circ C$. Zirconium metal is used in nuclear reactors due to its neutron absorption properties.



Test Conditions

Temperature range: RT ... $1200^\circ C$
Atmosphere: Ar at 60 ml/min
Sample holder: Standard 12.7 mm
Sensor: InSb

Test Results

The measurement was carried out during heating and cooling. It can be seen that there are significant differences

between the heating and cooling results. The thermal diffusivity decreases versus temperature up to $800^\circ C$. Then, a slight increase was obtained (most probably due to the increase in radiative heat transfer). The thermal conductivity follows more or less the behavior of the thermal diffusivity. It can be seen that there are irreversible changes during heating and cooling. Due to structural changes and annealing of defects in the structure, the thermal diffusivity and conductivity are higher during the cooling run.