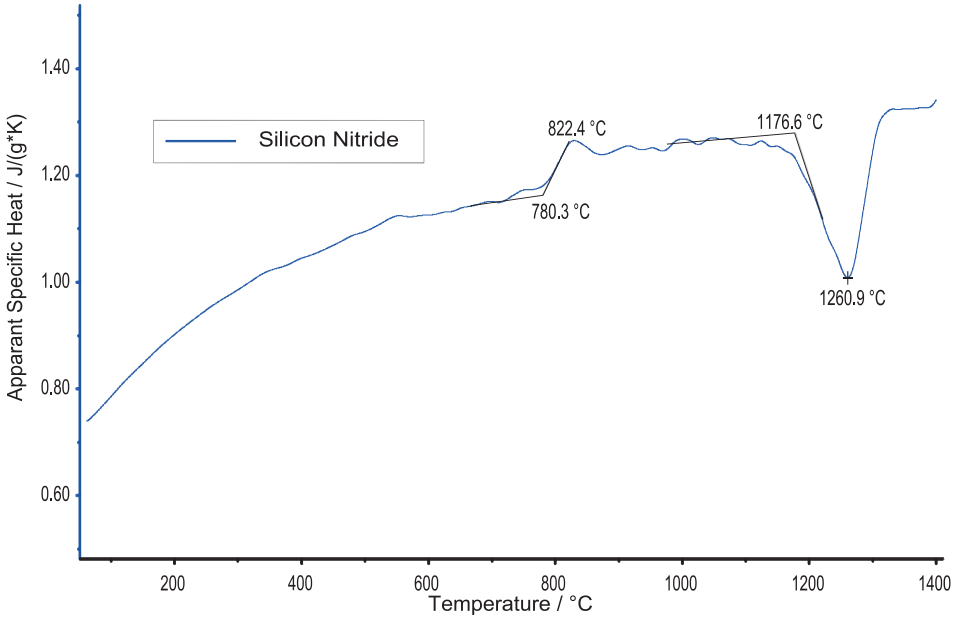
APPLICATION**SHEET**

Ceramics · Automotive
DSC 404 ***F1*** *Pegasus®*

Silicone Nitride (Green Body)

Introduction

Silicon nitride (Si_3N_4) is a hard, solid substance, that can be obtained from a direct reaction between silicon and nitrogen at high temperatures. Silicon nitride ceramics have a relatively good thermal shock resistance compared to other ceramics. Due to this, rollers made of silicon nitride ceramics are sometimes used in high-end skateboard bearings or in ball bearing systems of space ships (space shuttle). In microelectronic technology, silicon nitride is usually formed using chemical vapor deposition (CVD) method, or one of its variants, such as plasma-enhanced chemical vapor deposition (PECVD). It is usually used either as an insulator layer to electrically isolate different structures or as an etch mask in bulk micromachining. It has also been discussed to use silicon nitride materials for engine valves.



Test Conditions

Temperature range:	RT ... 1400°C
Heating rate:	20 K/min
Atmosphere:	Argon at 20 ml/min
Sample mass:	approx. 40 mg
Crucible:	Pt with A_2O_3 liner+lid
Sensor:	DSC type S

Test Results

Presented in the plot is the measured specific heat of a debinded silicon nitride green body (mixture of silicon nitride powder without organic binders). Between 780 and 822°C, an endothermal step can be seen. This step is due to the glass transition of an amorphous phase mainly created by silicon dioxide contamination inside the green body. At 1177°C (extrapolated onset), an exothermal effect starts. This is due to the cold-crystallization of the amorphous components inside the material. This example clearly demonstrates how impurities can influence the thermal behavior of such ceramic materials.

NGB · Application Sheet 127 · E · 0821 · Technical specifications are subject to change.

NETZSCH-Gerätebau GmbH
Wittelsbacherstraße 42 · 95100 Selb · Germany
Phone: +49 9287/881-0 · Fax: +49 9287/881505
at@netzsch.com · www.netzsch.com