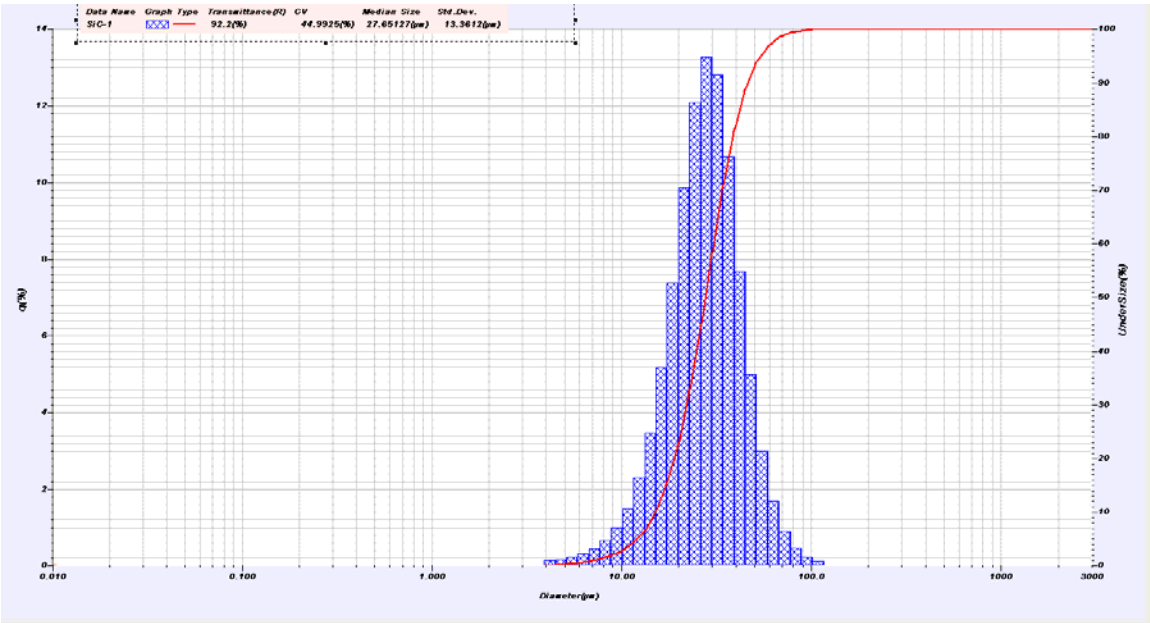
Applications Data Sheet

Silicon Carbide

Analytical test method

Refractive Index (particle): 2.65-0.10i
Dispersant fluid: Water, 0.1% Micro 90 surfactant
Sonication: 1 minute, power 7
Circulation speed: 5
Agitation speed: 2
Notes: Pre-dispersion with concentrated surfactant was used to wet the particle surface before adding to the dispersion fluid.



Example data

File Name:	6199-1
Median:	27.651 µm
Mean:	29.696 µm
S. D.:	13.361 µm
D(10%):	15.176 µm
D(90%):	46.474 µm

Discussion

Dispersion and analysis of silicon carbide is straightforward with relatively easy dispersion and good stability once dispersed. The built-in ultrasonic probe of the *Partica* LA-960 was useful to eliminate external preparation steps and the stability of the optical system provides very reproducible results.

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PARTICLE SIZE ANALYSIS OF SILICON CARBIDE

Summary
Silicon carbide (SiC) has a range of physical properties that makes it a versatile and useful material. It is one of the hardest materials known, second only to diamond, has a relatively low density (approximately the same as aluminum), good wear and corrosion resistance and low thermal expansion and high thermal conductivity leading to excellent thermal shock resistance.

Due to its high hardness, silicon carbide is used in many abrasive applications either as a slurry or fixed in a matrix such as grinding wheels. It is also highly abrasion-resistant, so can be used in parts such as nozzles, seals, and bearing components. The combination of high hardness, high elastic modulus, and low density makes boron carbide attractive for use in ballistic body armor.

Sintered alpha silicon carbide is produced by initially mixing fine (sub-micron) silicon carbide powder with non-oxide sintering aids. The powdered material is formed or compacted by using most of the conventional ceramic forming processes such as die pressing, isostatic pressing and injection molding. Following the forming stage the material is sintered in an inert atmosphere at temperatures above 2000°C. The sintered silicon carbide can then be machined to precise tolerances using a range of precision diamond grinding or lapping techniques.

The particle size distribution of the silicon carbide powder affects the manufacturing and mechanical properties of these components, including packing density and mechanical strength of the final part. For abrasive applications, the particle size affects both material removal rate and final surface finish.

The example data below was measured on the HORIBA *Partica* LA-960. To assure dispersion of agglomerates for testing, these materials are usually dispersed in water for measurement, with a non-ionic surfactant added to prevent agglomeration.