

# Fine Grain Ceramics Without The Compromises

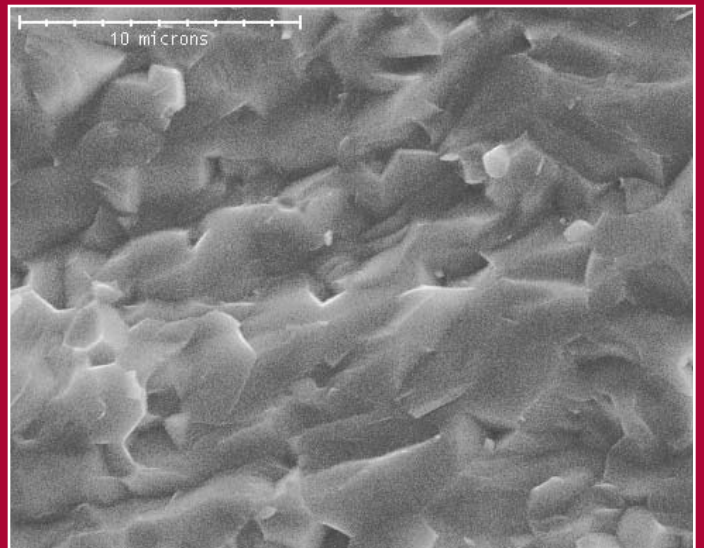
## Setting the Standard for Critical and High-Precision Applications

Imaging Arrays, Composite Designs, Actuators, and other high-precision components will benefit from our new Fine Grain Piezoelectric Ceramic. Other manufacturers sacrifice piezo properties when they reduce grain size. The Keramos design and process has created a fine grain ceramic that enhances the performance properties important to high frequency and fine pitch transducer designs. We have been advancing the piezo ceramic industry since 1968, and this new ceramic marks another leap forward. This next generation piezo material redefines the standard for fine grain ceramics.

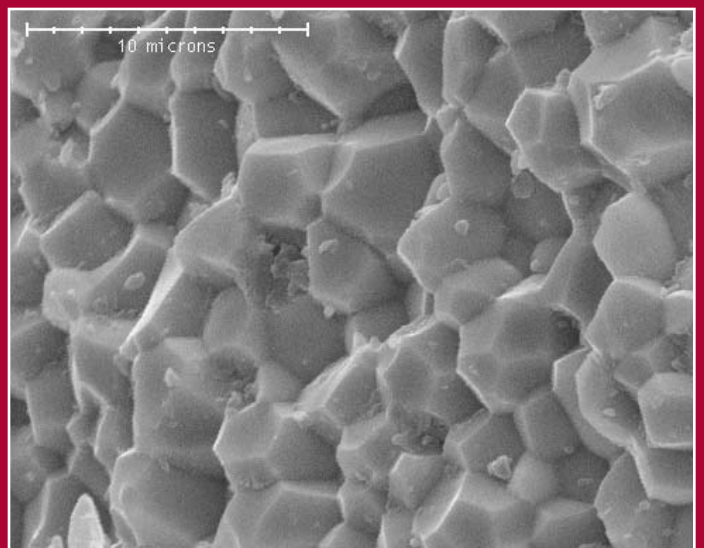
*Piezo Technologies' new Fine Grain Ceramics offer the following benefits:*

- **A less porous, more uniform Fine Grain Structure – A New Standard.**
- **Fine Grain Size enhances structural and performance uniformity of Fine Pitch Transducer Designs.**
- **Higher Dielectric Constant,  $d_{33}$  and  $Q_M$  versus similar grain structured designs.**
- **A Reliable Second Source for the CTS 3203HD Ceramic.**
- **A Viable First Choice for Fine Pitch Designs where enhanced performance and element to element uniformity is required.**

*\* See back for additional comparisons and information.*



**K-700 at 4800x, fractured surface** - Fine grain size and 40% improvement in fracture toughness creates transgranular fractures when ceramic is broken or diced, resulting in more uniform fine pitch elements.



**CTS 3203HD at 4800x, fractured surface** - Fine grain size with less fracture toughness creates intergranular fractures when the ceramic is broken or diced, resulting in non-uniform fine pitch elements.

Kézite K-700

## K-700 Performance – Comparison Characteristics

Piezo Technologies' Fine Grain Ceramics have been subjected to a multitude of comparison studies and quality tests to confirm that they will

offer you superior performance characteristics and reliability. Below are some of the comparisons that helped us place K-700 at the top of its category.

MATERIAL		COMPETITOR A	COMPETITOR B1	COMPETITOR B2	K-700
$K_{33}^T$	Dielectric Free	3850	4175	3670	4000
$K_{33}^S$	Clamped Dielectric				2910
$d_{33}$	Direct Charge Coefficient	650	675	670	700
$Q_M$	Thickness				30
$Q_M$	Radial	30	37	54	60
$T_C$	Curie Temp	225°C	190°C	190°C	210°C
$N_f$	KHz·in				79
$N_f$	Hz·m				2006
$V_s$	Velocity of Sound				4010
$D_{ave}$	Grain Size	2-5 um	3 um	1 um	2-5 um
Density		7.8			7.8

Keramoss is a world leader in the development of high performance piezo ceramics, including Lead Metaniobates, PZTs, 1-3 PZT / Polymer Composites, and we offer a full range of engineering design services to meet our customers' needs. We have been a leading manufacturer of advanced ceramics for more than three decades, and we are still pushing the industry forward. We have been awarded a NIST ATP grant, as well as other important grants, to continue our cutting-edge research in this area. In addition, meeting the continually increasing demands of our customers helps us stay at the forefront of the industry. We have a steady stream of new materials and products planned,

so please contact us if you would like to be routinely notified of our progress. Keramos and Piezo Technologies serves a wide range of industries, including medical, non-destructive testing, industrial, military, research, and much more.



To learn more about our new Fine Grain Ceramics, or our other products and services, please contact us today at 317-876-4670 or visit our website at [www.PiezoTechnologies.com](http://www.PiezoTechnologies.com).