Morgan
MorganTechnicalCeramics
ElectroCeramics

Introducing our new range of 1-3 Piezo Composite ceramic materials

Piezoelectric Composite materials, manufactured by Morgan Technical Ceramics ElectroCeramics, dramatically improve the performance of ultrasound and sonar transducers used in medical, biometric, military and industrial applications.

By fabricating Piezoelectric ceramic into precision pillar arrangements with a Polymer matrix filler, the composite configuration will outperform a monolithic component constructed solely of the same piezoelectric ceramic.

By combining the Piezoelectric ceramic and a Polymer filler, the overall density of a composite structure will better match the medium. As a result, the lower acoustic impedance allows for a higher energy transfer through body tissue or water, and therefore a lower reverberation level on the front face of the acoustic device.

Standard 1-3 Piezo Composite Material NEW!

We have launched a standard range of 1-3 Piezo Composite parts in three different materials.

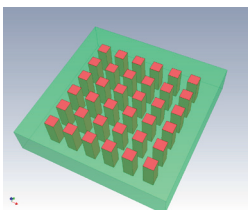
These materials can be supplied in plate form up to 40 x 40 mm. Alternative sizes and geometries such as discs are available upon request.

These are available in frequencies ranging from 200KHz to 1 MHz (10 - 2 mm thick)

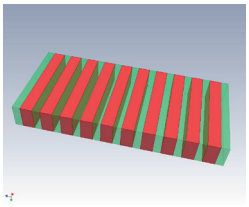
Material Type	Volume Fraction (%)	$\varepsilon_r^t 33$	Tan δ	Acoustic Impedance (MrayL)	k_t	q_m	r (g/cm)
pcm1-45	45	565	0.008	15	0.6	26	4100
pcm2-45	45	832	0.023	15	0.6	26	4000
pcm6-45	45	1880	0.022	13	0.66	25	4100
pcm6-15	15	620	0.023	5	0.72	13	1700

Custom Piezo Composite Material

We offer Piezoelectric custom composites in 1-3 and 2-2 architectures, in sizes up to 40mm square and frequencies from 100 kHz to 4 MHz.



The 1-3 structure is so named because pillars of ceramic are continuous in one dimension, while the Polymer is continuous in all three dimensions



In the 2-2 structure, both the ceramic and the Polymer filler are continuous in two dimensions with lengths of ceramic and polymer arranged in parallel

Transducers NEW!

We can offer complete transducers based on Piezo Composite technology. Our in house underwater acoustic test tanks and pressure testing facilities are used to validate performance of designs. This vertical integration of all process steps enables us to offer custom solutions in relatively short leadtimes. Transducers can be designed for the harsh environments seen in marine applications with appropriate matching layers, encapsulation and cables. Transducers based on 1-3 composite can be used to increase bandwith and sensitivity.

Materials For Piezo Ceramic Composite

In addition to providing composite materials and transducers we are also able to offer our wide range of Piezo ceramic materials for the manufacture of 1-3 composite products by OEM's or 3rd party providers. Special materials have been developed with higher densities and lower porosities to enable very fine structures to be created.

	PZT401	PZT5A1	PZT5H1	PZT508-HD	PZT-5K2 HD	PZT-5K4 HD	PMN / PT
Navy type	I	II	IV				Single Crystal
$\varepsilon_r^t 33$	1400	1800	3400	3900	6200	7100	4500-6000
d33	315	409	620	720	870	950	1200-2000
k33	0.67	0.67	0.72	0.75	0.75	0.75	0.88
Curie Temp (oc)	330	370	200	215	160	150	125-140
Density (kg/m3)	7600	7650	7350	7900	8200	8200	

Typical values measured at 20°C and 24 hours after polarisation

Benefits

- Addresses the mismatch between the density of Piezoelectric ceramic and the medium through which the sound waves travel
- Finely pitched composites act as one homogeneous material with lower acoustic impedance providing better resolution
- Added mechanical strength of the 2-2 structure benefits high frequency medical applications
- Large volume of polymers in the 1-3 structure lowers acoustical impedance in sonar applications
- The damping effect of the polymer reduces lateral vibration modes, cross coupling and spurious activity
- They can be manufactured in cylindrical, spherical or curved shapes
- They have a lower overall mass when compared to traditional monolithic devices of the same volume

How we support you

Design engineers can adjust the architecture, manufacturing process, material properties, and proportional content of ceramic versus Polymer, to optimize performance for the particular application.

Contact Information

For all enquires from Europe & Asia contact
Morgan Technical Ceramics ElectroCeramics, Antelope Park, Gavan Street, Thornhill, Southampton SO19 7TG
England

Tel: +44 (0) 2380 444 811
Fax: +44 (0) 2380 431768
Email: southampton.sales@morganplc.com

For all enquiries from America & Australia contact
Morgan Technical Ceramics Electroceramics, 232 Forbes Road, Bedford, Ohio, 44146-5418
USA

Tel: +1 (440) 232 8600
Fax: +1 (440) 232 8731
Email: bedford.sales@morganplc.com