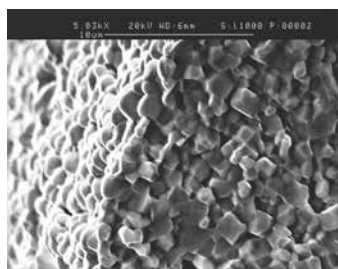
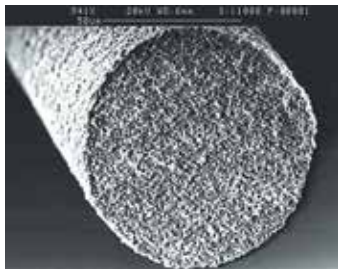




Piezo Ceramic Fibers



Smart Material Corp. is developing and manufacturing advanced piezo ceramic fibers. Our manufacturing process is based on the ALCERU® method as a green forming process. ALCERU® is a cellulose textile spinning technology, which allows to add PZT powder as a solid load. All piezo ceramic fibers are sold not poled and not electroded.

Piezo Ceramic Fiber characteristics:

Diameters:	105 μm up to 1000 μm (other diameters on request)
Length:	maximum 200 mm
Piezoceramic materials:	PZT 5A1, PZT 5H2

Note: Fibers are sold not poled and not electroded!

5A1, 5H2 TYPICAL MATERIAL PROPERTIES

Typical material properties of 5A and 5H piezoelectric ceramics used for Smart Material, Corp. fibers and composites. Lead zirconate titanate solid solutions, selected data measured at room temperature:

Piezoceramic	Symbol	Unit	5A1 Sonox P505	5H2 Sonox P53
DoD Standard 1376A (SH)			Type II	Type VI
Electrical Properties				
Permittivity/1kHz	$\epsilon_{33} T/\epsilon_0$		1850	3800
Dielectric dissipation factor/1kHz	$\tan \delta$		0.012	0.016
Curie temperature	T_c	$^{\circ}\text{C}$	335	215
Electromechanical Properties				
Coupling factors	k_p		0.62	0.65
	k_{31}		0.33	0.38
	k_{33}		0.72	0.74
	k_t		0.48	0.51
	k_{15}		0.74	0.73
Piezoelectric charge coefficients	d_{33}	10^{-12} C/N	440	680
	$-d_{31}$		185	275
	d_{15}		560	770
Piezoelectric voltage coefficients	g_{33}	10^{-3} Vm/N	25.5	19
Frequency constants	N_p	kHz mm	2020	1960
	N_t		2030	1885
	N_l		1325	1420
	N_3		1250	1290
Mechanical Properties				
compliance	s_{11}^E	10^{-12} m/N	18.5	15.8
	s_{33}^E		20.7	22.9
stiffness	c_{33}^D	10^{10} N/m^2	15.7	15.2
	c_{55}^D		6.5	6.1
Mechanical Quality Factor	Q_m		80	75

SMART MATERIAL
Advanced Piezo Composites

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Manufacturing methods covered by
various patents