Innovia PMN-PT Crystal Properties (Typical)

Medical Ultrasound Grade [001]-oriented PMN-PT		
	Low PT Content （28～30%PT）	High PT Content （30～32%PT）
Materials Type	001PMN-L	001PMN-H
Mechanical		
Density (g/cc)	8.00	8.05
Poisson's Ratio	0.32	0.32
Speed of Sound （m/s）	4140	4340
Acoustic Impedance (MRayls)	33.2	35.0
Elastic Constant s_{33}^E （$10^{-12}m^2/N$）	60	60
s_{33}^D（$10^{-12}m^2/N$）	12	12
Electro-mechanical		
d_{33} （pC/N）	1,200	1,600
d_{31} （pC/N）	-850	-1000
Coupling Bar k_{33}	0.90	0.92
Coupling Plate k_t	0.60	0.62
Phase Transition Temperature（°C）	100	90

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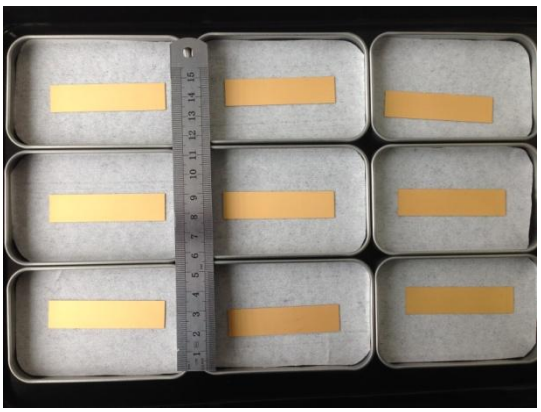
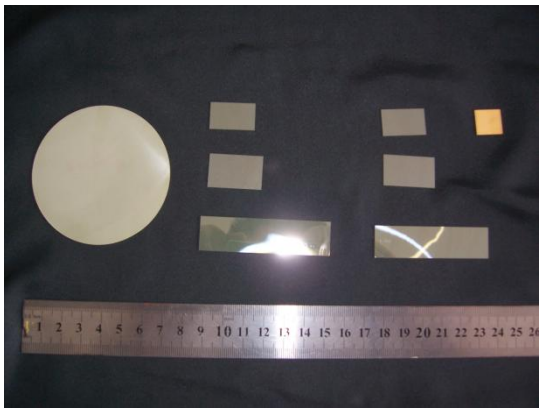
Electrical		
Free Dielectric Constant K_3^T	**5,000**	**6,500**
Clamped Dielectric Constant K_3^S (80MHz)	**1400**	**1800**
Coercive Field (kV/cm)	**3.0**	**2.7**
Loss tanδ（%）	**<0.5**	**<0.9**
Thermal		
Specific Heat Capacity at RT (10^6 J $g^{-1}K^{-1}$)	**0.326**	**0.324**
Thermal conductivity (W/mK)	**1.38**	**1.40**

*Note: Piezoelectric properties are obtained according to IEEE Standard, 176-1987





Various Crystal Products Forms

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Innovia PMN-PT Properties (Extended)

Medical Ultrasound Grade [001]-oriented PMN-PT		
PMN-	(27～30%) PT	(30～33%) PT
Material Type	001PMN-L	001PMN-H
Density (10^3 Kg/m3)	8.0	8.0
Mechanical Quality Factor Qm	200	100
Dielectric Constant ε_{33}^{s}	1400	1800
Dielectric Constant ε_{11}^{s}	3300	1440
Piezoelectric Constant e_{31} (C/m3)	-2.4	-3.4
Piezoelectric Constant e_{33} (C/m3)	27.0	20.4
Piezoelectric Constant e_{15} (C/m3)	13.5	10.1
Young’s Modulus C_{11}^{E} (10^10N/m2)	11.7	11.5

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Young’ s Modulus C_{12}^{E} (10^10N/m2)	10.3	10.3
Young’ s Modulus C_{13}^{E} (10^10N/m2)	10.1	10.2
Young’ s Modulus C_{33}^{E} (10^10N/m2)	10.7	10.4
Young’ s Modulus C_{44}^{E}	7.1	6.9
Young’ s Modulus C_{66}^{E} (10^10N/m2)	6.6	6.6

Note:

1. Piezoelectric properties are obtained according to IEEE Standard on Piezoelectricity 176-1987.
2. All values are exampled values for the sake of clarity.

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