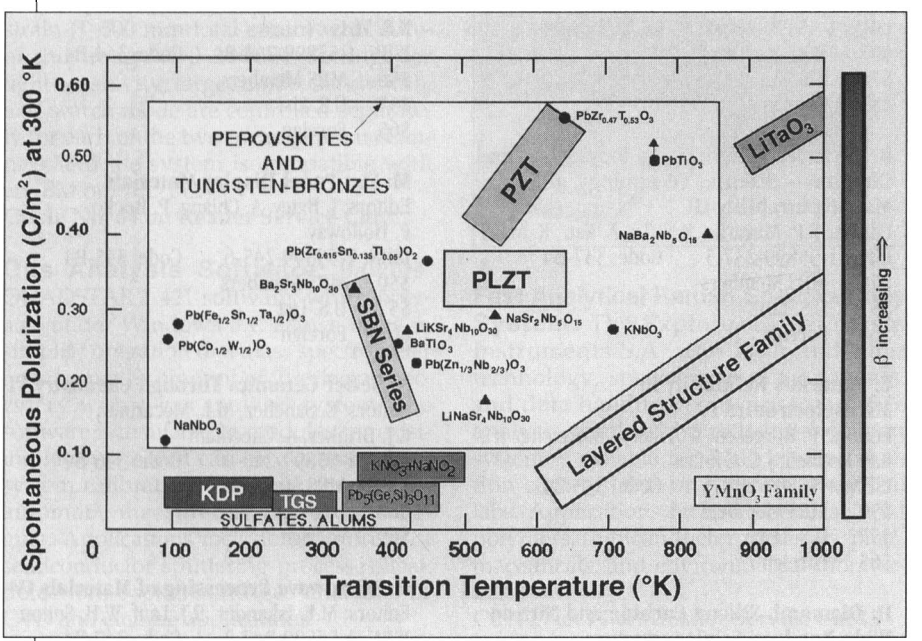
Spontaneous Polarization for Ferroelectric Materials

B.A. Tuttle, Sandia National Laboratories;
D.A. Payne and J.L. Mukherjee, University of Illinois



Material	T_c (°K)	d (Mg/m³)	β (MVm/C•°K)	P_s (298°K) (C/m²)	C_p (298°K) (J/kg•°K)	P_s (T_c) (C/m²)	C_p (T_c) (J/kg•°K)
$LITaO_3$	891	7.45	0.71	0.50	430	0.36 (723)	430 (300)
$LiNbO_3$	1483	4.64	0.91	0.71	640	0.67 (723)	640 (300)
$BaTiO_3$	403	6.02	0.67	0.26	418	0.19	668
$K(Nb)O_3$	691	4.59	0.47	0.30	740	0.26	740
$K(Nb_{0.94}Ta_{0.60})O_3$	656	4.29	0.54	-	-	0.18	792 (298)
$K(Nb_{0.82}Ta_{0.18})O_3$	591	4.29	0.61	-	-	0.05	724 (298)
$PbTiO_3$	763	7.50	1.00	0.81 0.50	360 360	- -	- -
PZT(95/5)	493	7.41	0.32	0.34	451	0.23	451 (300)
PLZT(8/65/35)	383	7.41	0.02	0.34	451	0.20	451 (300)
PSZT	450	7.41	0.40	0.34	451	0.20	451 (300)
$Ba_2NaNb_5O_{15}$	833	5.65	0.57	0.40	403	-	-
SBN(60/40)	351	5.20	0.32	0.34	397	-	-
SBN(50/50)	398	5.20	0.08	-	-	0.11	397 (300)
KDP	123	2.34	79.20	0.05 (100)	305	0.03	368 (100) 3680
$NaNO_2$	436	2.15	17.00	0.08	1090	0.05	1511 (403) 39300
TGS	322	1.69	30.60	0.03	971	0.02 (318)	1883
Rochelle Salt	298	1.78	50.40	0.01	741	-	-
$Pb_5Ge_3O_{11}$	451	8.05	11.30	0.05	836	-	-

Various families of ferroelectric materials can be seen in the graph of spontaneous polarization versus Curie temperature. For many applications, a figure of merit can be based on the polarization; processing or use considerations must take into account the transition temperature. T_c is the transition temperature, β is the Curie constant, d is the density, P_s is the spontaneous polarization, and C_p is the heat capacity. From *Ferroelectrics* **27** (1980) p. 220, with permission. Graphics by Mike Youngman, Sandia National Laboratories.

The *MRS Bulletin*'s Facts and Figures department presents graphs, nomographs, tables, charts, and frequently used information of the type compiled by materials researchers and often taped to the walls by their desks. These "cheat sheets" are intended to be not only interesting but useful enough to keep for reference. Please send your comments and any potential material for future publication to: Alan Hurd (ajhurd@sandia.gov), Sandia National Laboratories, Albuquerque, NM 87185-0609.

https://doi.org/10.1557/S0883769400047497 Published online by Cambridge University Press