Appendix A
List of Abbreviations

ECF	Electromechanical coupling factor
EFM	Effective field method
FC	Ferroelectric ceramic
FEM	Finite element method
KNN-T	$(K_{0.562}Na_{0.438})(Nb_{0.768}Ta_{0.232})O_3$
KNN-TL	$[Li_x(K_{0.501}Na_{0.499})_{1-x}](Nb_{0.660}Ta_{0.340})O_3$
KNNTL:Mn,	$[Li_x(K_{1-y}Na_y)_{1-x}](Nb_{1-z}Ta_z)O_3$:Mn (see Table 1.2)
LBO	$Li_2B_4O_7$
NBT–*x*BT	$(1 - x)(Na_{0.5}Bi_{0.5})TiO_3 - xBaTiO_3$
PCR	Piezoelectric ceramic from Rostov-on-Don (Russia)
*x*PIN–*y*PMN–(1 – *x* − *y*)PT	$xPb(In_{1/2}Nb_{1/2})O_3 - yPb(Mg_{1/3}Nb_{2/3})O_3 - (1 - x - y)PbTiO_3$
PMN–*x*PT	$(1 - x)Pb(Mg_{1/3}Nb_{2/3})O_3 - xPbTiO_3$
PS	Piezoelectric sensitivity
PZN–*y*PT	$(1 - x)Pb(Zn_{1/3}Nb_{2/3})O_3 - xPbTiO_3$
PZT	Piezoelectric ceramic of the $Pb(Zr, Ti)O_3$ type
SC	Single crystal
ZTS	Piezoelectric ceramic of the $Pb(Zr, Ti)O_3$ type (Russia)

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Appendix B
Electromechanical Constants of Components

To analyse the piezoelectric performance, effective properties and related parameters of composites, we use full sets of electromechanical constants of components. A systematisation of data on the components is given in Table B.1.

Table B.1 Room-temperature electromechanical constants of components

Component	Composition	Set of constants	Table number
SC	$BaTiO_3$[a]	s^E_{ab}, d_{ij} and ε^σ_{pp}	1.1
	KNN-T[b]	s^E_{ab}, d_{ij} and ε^σ_{pp}	1.2
	KNN-TL[b]	s^E_{ab}, d_{ij} and ε^σ_{pp}	1.2
	KNNTL:Mn[b]	s^E_{ab}, d_{ij} and ε^σ_{pp}	1.2
	PMN–0.33PT[b]	s^E_{ab}, d_{ij} and ε^σ_{pp}	1.3
	PMN–0.33PT[c]	s^E_{ab}, d_{ij} and ε^σ_{pp}	2.3
	PMN–0.30PT[b]	s^E_{ab}, d_{ij} and ε^σ_{pp}	1.3
	PMN–0.29PT[d]	s^E_{ab}, d_{ij} and ε^σ_{pp}	1.4
	PMN–0.28PT[b]	s^E_{ab}, d_{ij} and ε^σ_{pp}	1.3
	PMN–0.28PT[d]	s^E_{ab}, d_{ij} and ε^σ_{pp}	1.4

(continued)

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Table B.1 (continued)

Component	Composition	Set of constants	Table number
	PMN–0.28PT[c]	s^E_{ab}, d_{ij} and ε^σ_{pp}	2.3
	PZN–0.09PT[d]	s^E_{ab}, d_{ij} and ε^σ_{pp}	1.4
	PZN–0.08PT[b]	s^E_{ab}, d_{ij} and ε^σ_{pp}	1.3
	PZN–0.07PT[b]	s^E_{ab}, d_{ij} and ε^σ_{pp}	1.3
	PZN–0.07PT[d]	s^E_{ab}, d_{ij} and ε^σ_{pp}	1.4
	PZN–0.045PT[b]	s^E_{ab}, d_{ij} and ε^σ_{pp}	1.3
	0.26PIN– 0.42PMN– 0.32PT:Mn[b]	s^E_{ab}, d_{ij} and ε^σ_{pp}	1.3
	0.26PIN– 0.42PMN– 0.32PT:Mn[d]	s^E_{ab}, d_{ij} and ε^σ_{pp}	1.4
	0.27PIN– 0.40PMN– 0.33PT[b]	s^E_{ab}, d_{ij} and ε^σ_{pp}	1.3
	NBT–0.05BT[b]	s^E_{ab}, d_{ij} and ε^σ_{pp}	1.3
	LBO[e]	c^E_{ab}, e_{ij} and ε^ξ_{pp}	3.1
FC[f]	Compositions with perovskite-type structure ($BaTiO_3$, PZT, PCR, ZTS, modified $PbTiO_3$, etc.)	s^E_{ab}, d_{ij} and ε^σ_{pp}	1.5
	Compositions with perovskite-type structure ($BaTiO_3$, PZT, PCR, ZTS, modified $PbTiO_3$, etc.)	e_{ij}, g_{ij} and h_{ij}	1.6
	$(Pb_{1-x}Ca_x)TiO_3$[h]	c^E_{ab}, e_{ij} and ε^ξ_{pp}	3.5

(continued)

Table B.1 (continued)

Component	Composition	Set of constants	Table number
Polymer	Araldite[h]	s_{ab} and ε_{pp}	2.1
	Polyurethane[h]	s_{ab} and ε_{pp}	2.1
	Elastomer[h]	s_{ab} and ε_{pp}	2.1
	PE (monolithic)[h]	s_{ab} and ε_{pp}	2.1
	Auxetic PE[h]	s_{ab} and ε_{pp}	2.1
	PVDF[i]	s^E_{ab}, d_{ij} and ε^σ_{pp}	3.7

[a]Polydomain SC, *mm*2 symmetry, calculated electromechanical constants
[b]Domain-engineered [001]-poled SC, 4*mm* symmetry
[c]Single-domain [111]-poled SC, 3*m* symmetry
[d]Domain-engineered [011]-poled SC, *mm*2 symmetry
[e]Piezoelectric SC, 4*mm* symmetry
[f]Poled FC, ∞*mm* symmetry
[g]Calculated electromechanical constants
[h]Piezo-passive polymer, isotropic medium
[i]Poled ferroelectric polymer, ∞*mm* symmetry

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