Erratum: "Thermodynamics of the superconducting phase transformation in high T_c ceramics with magnetoelectric effects" [J. Mater. Res. 4, 33 (1989)]

S. J. Burns
Materials Science Program, Department of Mechanical Engineering, University of Rochester, Rochester, New York 14627

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The appendix to the paper, "Thermodynamics of the superconducting phase transformation in high T_c ceramics with magnetoelectric effects," *J. Mater. Res.*, Vol. 4, No. 1, Jan/Feb 1989, pp. 33–38, contains typesetting errors. The thermodynamic state variables used in the incremental energy balance of the first law of thermodynamics are given in units of energy per unit mass. The work terms for the magnetic field, H, and the magnetic induction, B, are in units of energy per unit volume. The volume per unit mass, v, when used as a multiplier converts from volume to mass units. The thermodynamic definitions in mass units are underlined. Thus, $d\underline{B} = v dB$ for magnetic induction and $d\underline{D} = v dD$ for electric displacement. The quantities in Appendix A are a complete set of self-consistent thermodynamic properties. However, this method of incremental conversions from volume to mass units is, the author believes, unique to this paper. This is the corrected appendix:

APPENDIX A

The following table gives definitions and Maxwell relations:

	$\left.\frac{\partial}{\partial T}\right\|_{p,H,E,n_0}$	$\left.\frac{\partial}{\partial p}\right\|_{T,H,E,n_0}$	$\left.\frac{\partial}{\partial H}\right\|_{T,p,E,n_0}$	$\left.\frac{\partial}{\partial E}\right\|_{T,p,H,n_0}$	$\left.\frac{\partial}{\partial n_0}\right\|_{T,p,H,E}$
G	$-S$	v	$-\underline{B}$	$-\underline{D}$	ϕ_0
S	c_p/T	$-\alpha v$	$c_1 v$	$c_2 v$	$\overline{\gamma}_0$
v	αv	$-\beta_T v$	$c_3 v$	$c_4 v$	$\overline{v}_0$
$\underline{B}$	$c_1 v$	$-c_3 v$	$\mu_M v$	$c_5 v$	$\overline{b}_0$
$\underline{D}$	$c_2 v$	$-c_4 v$	$c_5 v$	$K_E v$	$\overline{d}_0$
ϕ_0	$-\overline{\gamma}_0$	$\overline{v}_0$	$-\overline{b}_0$	$-\overline{d}_0$	$\overline{\omega}_{00}$

$$C_p = T\left.\frac{\partial S}{\partial T}\right|_{p,H,E,n_0} = \text{heat capacity},$$

$$\beta_T = \frac{-1}{v}\left.\frac{\partial v}{\partial p}\right|_{T,H,E,n_0} = \text{compressibility};$$

$$\mu_M = \frac{1}{v}\left.\frac{\partial \underline{B}}{\partial H}\right|_{T,p,E,n_0} = \left.\frac{\partial B}{\partial H}\right|_{T,p,E,n_0} = \text{permeability},$$

$$K_E = \frac{1}{v}\left.\frac{\partial \underline{D}}{\partial E}\right|_{T,p,H,n_0} = \left.\frac{\partial D}{\partial E}\right|_{T,p,H,n_0} = \text{permittivity};$$

$$\overline{\omega}_{00} = \left.\frac{\partial \phi_0}{\partial n_0}\right|_{T,p,H,E} = \text{chemical self interaction}$$

The bar quantities are partial molar properties such as the partial molar volume $\overline{v}_0$, partial molar entropy $\overline{\gamma}_0$, partial molar magnetism, $\overline{b}_0$, and partial molar electric displacement, $\overline{d}_0$.

$$\alpha = \frac{1}{v}\left.\frac{\partial v}{\partial T}\right|_{p,H,E,n_0} = \text{thermal expansion (volume)}$$

$$C_1 = \frac{1}{v}\left.\frac{\partial \underline{B}}{\partial T}\right|_{p,H,E,n_0} = \left.\frac{\partial B}{\partial T}\right|_{p,H,E,n_0} = \text{magnetic temperature dependence};$$

$$C_2 = \frac{1}{v}\left.\frac{\partial \underline{D}}{\partial T}\right|_{p,H,E,n_0} = \left.\frac{\partial D}{\partial T}\right|_{p,H,E,n_0} = \text{electric temperature dependence};$$

$$C_3 = \frac{-1}{v}\left.\frac{\partial \underline{B}}{\partial p}\right|_{T,H,E,n_0} = \left.\frac{-\partial B}{\partial p}\right|_{T,H,E,n_0} = \text{piezo-magnetic}$$

$$C_4 = \frac{-1}{v}\left.\frac{\partial \underline{D}}{\partial p}\right|_{T,H,E,n_0} = \left.\frac{-\partial D}{\partial p}\right|_{T,H,E,n_0} = \text{piezoelectric}$$

$$C_5 = \frac{1}{v}\left.\frac{\partial \underline{D}}{\partial H}\right|_{T,p,E,n_0} = \left.\frac{\partial D}{\partial H}\right|_{T,p,E,n_0} = \left.\frac{\partial B}{\partial E}\right|_{T,p,H,n_0}$$

$$= \text{magnetoelectric effect}$$

