Planar faults in metastably retained hexagonal BaTiO$_3$. YU-CHUAN WU, HONG-YANG LU — Hot-pressed BaTiO$_3$ ceramic samples contain predominantly h-BaTiO$_3$ as determined by XRD, and with a trace amount of t-BaTiO$_3$ as revealed by TEM. Extended planar stacking faults (EPSF’s) found ubiquitously in hot-pressed samples having the eligible fault vectors $R_{F(I)} = (1/2)c + p(I)$ and $R_{F(II)} = (n/6)c + p’(II)$, containing both $p(I) = 1/3\langle 2110 \rangle$, $p’(II) = 1/3\langle 1010 \rangle$, $n = 1, 2, 4, \text{and} 5$, and $c = [0001]$, have been determined by contrast analysis using the $2\pi g R_F = 0$ or $2\pi$ criteria crystallographically, and the number of layers along $c$ confirmed by high-resolution imaging uniquely. Two general types of EPSF’s are found; one group with only three vectors of the six degeneracies of the $p$-component $\langle 1010 \rangle$ eligible and the other with all six degeneracies of the $p$-component $\langle 2110 \rangle$ eligible for the fault vector. The latter is analogously a $\pi$-rotation fault (as in DO$_{19}$ intermetallics) that a rotation about $[0001]$ by $180^\circ$ (or $60^\circ$) arrives at another eligible fault vector. The metastable retention of the high-temperature h-BaTiO$_3$ phase is discussed in favour of oxygen deficiency.

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