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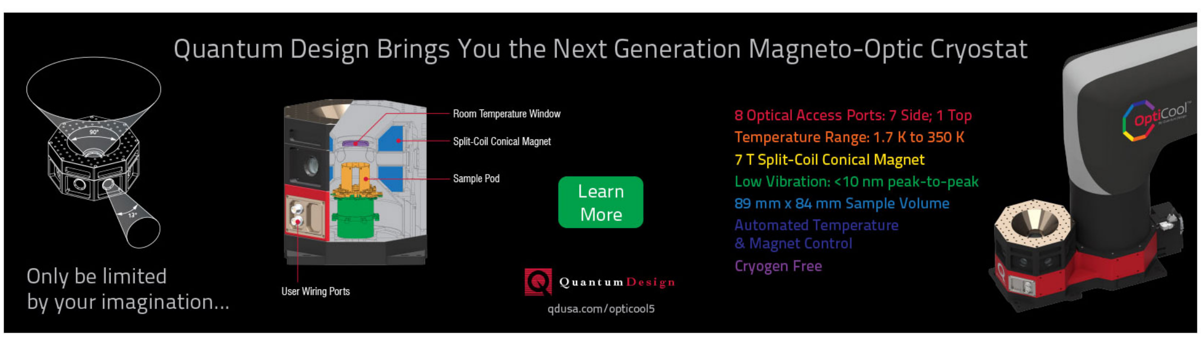
Citation: Journal of Applied Physics **111**, 059901 (2012); doi: 10.1063/1.3684987
View online: https://doi.org/10.1063/1.3684987
View Table of Contents: http://aip.scitation.org/toc/jap/111/5
Published by the American Institute of Physics



Erratum: Piezoelectric thin-film super-lattices without using piezoelectric materials [J. Appl. Phys. 108, 024304 (2010)]

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(Received 25 December 2011; accepted 14 January 2012; published online 1 March 2012)

[doi:10.1063/1.3684987]

In this erratum, we would like to correct some inadvertent typographical errors as well as clarify an issue related to the form of energy we used.

Typographical Errors:

1- Equation (25C): $\Lambda_{ij} = b_{ijkl}P_{k,l} + d_{ijkl}e_{k,l}$.
The correct equation is: $\Lambda_{ij} = b_{ijkl}P_{k,l} + d_{ijkl}e_{kl}$.

2- Equation (32): $u = A_3 + A_4 x + \frac{(d-f)}{c} e^{(-\frac{x}{l})}\left(A_1 + A_2 e^{(\frac{2x}{l})}\right)$.
The correct equation is: $u = A_3 + A_4 x - \frac{(d-f)}{c} e^{(-\frac{x}{l})}\left(A_1 + A_2 e^{(\frac{2x}{l})}\right)$.

3- Equation (37b): $u_1 = \frac{\sigma}{c_1}\left(x + \frac{\sigma Sech\left(\frac{w_1}{2l_1}\right) Sinh\left(\frac{x}{l_1}\right) h_1^2 \varepsilon_0}{c_1 l_1 \eta_1}\right)$.
The correct equation is:
$u_1 = \frac{\sigma}{c_1}\left(x + \frac{Sech\left(\frac{w_1}{2l_1}\right) Sinh\left(\frac{x}{l_1}\right) h_1^2 \varepsilon_0}{c_1 l_1 \eta_1}\right)$.

4- Equation (39b):
$u_1 = A_{13} + A_{14}x + \frac{h_1}{c_1}\exp\left(-\frac{x}{l_1}\right)\left(A_{11} + A_{12}\exp\left(2\frac{x}{l_1}\right)\right)$.
The correct equation is
$u_1 = A_{13} + A_{14}x - \frac{h_1}{c_1}\exp\left(-\frac{x}{l_1}\right)\left(A_{11} + A_{12}\exp\left(2\frac{x}{l_1}\right)\right)$.

The form of energy used and boundary conditions:

The total electric enthalpy density expressed in the main paper has the following expression:

$$\Sigma = \frac{1}{2}a_{kl}P_kP_l + \frac{1}{2}b_{ijkl}P_{i,j}P_{k,l} + \frac{1}{2}c_{ijkl}e_{ij}e_{kl} + d_{ijkl}P_{i,j}e_{kl} + f_{ijkl}P_iu_{j,kl} - (\varepsilon_0E_i + P_i)E_i. \quad (1)$$

In a previous work of two of the authors,[1] we also had an extra term in the enthalpy density that ensures thermodynamic stability of the total energy $\frac{1}{2}g_{ijklmn}u_{i,jk}u_{l,mn}$. This term represents the contribution of purely elastic nonlocal effects. Our motivation for excluding this term in the original manuscript is that this contribution is generally found to be small,[2] although, if flexoelectricity is incorporated, it is required to guarantee thermodynamic stability. With this new term in place, instead of the polarization continuity condition at the interface, we use a variationally derived boundary condition $((f_1P_1 + g_1u_{1,11}|)_{x\to 0} - (f_2P_2 + g_2u_{2,11})|_{x\to 0}) = 0$.

We have re-solved the bilayer problem with the new energy function to test whether incorporation of the purely nonlocal elastic term and the new boundary condition have any major impact on the results presented in the original manuscript. We find that there is no qualitative change in the problems we studied. There is a very minor numerical difference. For example, using a conservative estimate of $g = 2.73\ 10^{-9}N$, we conclude that the bilayer leads to an effective piezoelectric constant of 30% of bulk $BaTiO_3$ compared to 23% in the main paper.

While the contribution of the nonlocal elastic term is small for the problems studied in our original manuscript, it is indeed possible that this term is important in other cases.

ACKNOWLEDGMENTS

The corresponding author would like to thank Professor Kaushik Dayal for raising the issue related to the nonlocal elastic terms as well as numerous discussions, Professor Lip-ing Liu for insightful discussions, Mohamed Gharbi and Brahmi Hatem for checking and verifying both the old results and the corrections in the erratum.

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