

REFERENCES

1. Gahdhi, M. V. and Thomson, B. S., Smart materials and structures, Chapman and Hall, London, 1992.
2. Newnham, R. E. and Ruschau, G. R., Smart electroceramics, *J. Am. Ceram. Soc.*, 1991, **74**, 463-480.
3. Xue, J., Wan, D., Lee, S. and Wang, J., Mechanochemical synthesis of lead zirconate titanate from mixed oxides, *J. Am. Ceram. Soc.*, 1999, **82**, 1687-1692.
4. Shrout, T. R., Papet, P., Kim, S. and Lee, G. S., Conventionally prepared submicrometer lead-based perovskite powders by reactive calcinations, *J. Am. Ceram. Soc.*, 1990, **73**, 1862-1867.
5. Kakegawa, K., Arai, K., Sasaki, Y. and Tomizawa, T., Homogeneity and properties of lead zirconium titanate prepared by a combination of thermal decomposition method with solid-state reaction, *J. Am. Ceram. Soc.*, 1998, **71**, C 49- C 52.
6. Messing, G. L., Zhang, S. C. and Tayanthi, G. V., Ceramic powder synthesis by spray pyrolysis, *J. Am. Ceram. Soc.*, 1993, **76**, 2707-2726.
7. Das, R. N., Pathak, A. and Pramanik, P., A novel chemical route for the preparation of nanocrystalline PZT powders, *J. Am. Ceram. Soc.*, 1998, **81**, 3357-3360.
8. Wang, H. W., Hall, D. A. and Sale, F. R., Phase homogeneity and segregation in PZT powders prepared by thermal decomposition of metal-EDTA complexes derived from nitrate and chloride solutions, *J. Am. Ceram. Soc.*, 1992, **75**, 24-31.

9. Matthes, B., Tomandl, G. and Warner, G., Characterization of PZT thin film prepared by a modified sol-gel method, *J. Eur. Ceram. Soc.*, 1999, **19**, 1387-1389.
10. Suzuki, H., Hoizumi, T., Kondo, Y. and Kaneko, S., Low-temperature processing of $\text{Pb}(\text{Zr}_{0.53}\text{Ti}_{0.47})\text{O}_3$ thin film from stable precursor sol, *J. Eur. Ceram. Soc.*, 1999, **19**, 1397-1401.
11. Alguero, M., Calzada, M. L., Snoeck, E. and Pardo, L., Microstructure ferroelectric properties relationships in sol-gel prepared lanthanum modified lead titanate thin film, *J. Eur. Ceram. Soc.*, 1999, **19**, 1501-1505.
12. Abothu, I. R., Liu, S. F., Komarneni, S. and Li, Q. H., Processing of $\text{Pb}(\text{Zr}_{0.52}\text{Ti}_{0.48})\text{O}_3$ (PZT) ceramics from microwave and conventional hydrothermal powders, *Mater. Res. Bull.*, 1999, **34**, 1411-1419.
13. Yanakisawa, K., Rendon-Angeles, J. C., Kanai, H. and Yamashita, Y., Stability and single crystal growth of dielectric materials containing lead under hydrothermal conditions, *J. Eur. Ceram. Soc.*, 1999, **19**, 1033-1036.
14. Traianidis, M., Courtois, C., Leriche, A. and Thierry, B., Hydrothermal synthesis of lead zirconate titanate (PZT) powders and their characteristics, *J. Eur. Ceram. Soc.*, 1999, **19**, 1023-1026.
15. Thomson, J. Jr., Chemical preparation of PLZT powders from aqueous nitrate solutions, *Ceram. Bull.*, 1974, **53**, 421-433.
16. Cady, W. G., Piezoelectricity, McGraw Hill, New York, 1980.
17. Haertling, G. H., Ferroelectric ceramics: history and technology, *J. Am. Ceram. Soc.*, 1999, **82**, 797-818.

18. Xu, Y., Ferroelectric materials and their applications, North Holland, 1991, 101-210.
19. Moulson, A. J. and Herbert, J. M., Electroceramics, Chapman and Hall, 1993, 353-354.
20. IEEE standard definitions of primary ferroelectric terms, ANSI/IEEE Std. 180-986, IEEE, New York, 1986, 1-21.
21. Smart, L. and Moore E., Solid state chemistry, 2nd ed., Chapman and Hall, London, 1996.
22. Jaffe, B., Cook, Jr. and Jaffe, H., Piezoelectric ceramics, Academic Press, New York, 1971, 117-142.
23. Shirane, G., and Suzuki, K., Crystal structure of $\text{Pb}(\text{Zr},\text{Ti})\text{O}_3$, *J. Phys. Soc. Jpn.*, 1952, 7, 333-336.
24. Newnham, R. E., Molecular mechanisms in smart materials, *MRS Bull.*, 1997, 22, 20-34.
25. Jones, D. J., Prasad, S. E. and Wallace, J. B., Piezoelectric materials and their applications, *Key Eng. Mater.*, 1996, 122, 71-144.
26. Berlincourt, D., Piezoelectric ceramic compositional development, *J. Acoust. Soc. Am.*, 1992, 91, 3034-3040.
27. Haertling, G. H. and Land C. E., Hot-pressed $(\text{Pb},\text{La})(\text{Zr},\text{Ti})\text{O}_3$ ferroelectric ceramics for electrooptic applications, *J. Am. Ceram. Soc.*, 1971, 54, 1-11.
28. Dawson, W. J., Hydrothermal synthesis of advanced ceramics powders, *Ceram. Bull.*, 1998, 67, 1673-1678.

29. Greskovich, C., Milling treatise on materials science and technology in Ceramic Fabrication Processes, edited by Wang, F. F. Y., Academic Press, New York, 1976, 9, 15-33.
30. Cramer, D., High-energy milling of PZT: in Ceramic Transactions; Ceramic Processing Science and Technology, Am. Ceram. Soc., 1995, 51.
31. Matsuo, Y. and Sasaki, H., Formation of lead zirconate titanate solid solutions, *J. Am. Ceram. Soc.*, 1965, 48, 289-291.
32. Chandratreya, S. J., Fulrath, R. M. and Pask, J. A., Reaction mechanisms in the formation of PZT solid solution, *J. Am. Ceram. Soc.*, 1981, 64, 422-425.
33. Hiremath, B. V., Kingon, A. I. and Biggers, J. V., Reaction sequence in the formation of lead zirconate - lead titanate solid solution: role of raw materials, *J. Am. Ceram. Soc.*, 1983, 66, 790-793.
34. Kakegawa, K., Mohri, J., Takahashi, T., Yamamura, H. and Shirasaki, S. A., Compositional fluctuation and properties of $\text{Pb}(\text{Zr},\text{Ti})\text{O}_3$, *Solid State Comm.*, 1977, 24, 769-772.
35. Kakegawa, K., Matsunaga, O., Kato, T. and Sasaki, Y., Compositional change and compositional fluctuation in $\text{Pb}(\text{Ti}, \text{Zr})\text{O}_3$ containing excess PbO , *J. Am. Ceram. Soc.*, 1995, 78, 1071-1075.
36. Shirasaki, S., Takahashi, K. and Kakegawa, K., Ferroelectric - paraelectric phase transition in lead titanate containing lattice defects, *J. Am. Ceram. Soc.*, 1973, 56, 430-435.
37. Yamamoto, T., Optimum preparation methods for piezoelectric ceramics and their evaluation, *Am. Ceram. Soc. Bull.*, 1992, 71, 978-985.

38. Singh, A. P., Mishra, S. K., Pandey, D., Prasad, C. D. and Lal, R., Low-temperature synthesis of chemically homogeneous lead zirconate titanate (PZT) powders by a semi-wet method, *J. Mater. Sci.*, 1993, **28**, 5050-5055.
39. Kimura, T., Takenaka, A., Mufine, T., Hayashi, Y. and Yamaguchi, T., Preparation of needle-like $TiZrO_4$ and PZT powders, *J. Mater. Sci.*, 1992, **27**, 1479-1483.
40. Yamamoto, T., Shimizu, Y. and Watanabe, M., Nb_2O_5 additive effects for sintering and electrical properties in $Pb(Zr_{0.53}Ti_{0.47})O_3$ ceramics using hydrothermally produced powder, *J. Ceram. Soc. Jpn. Int. Ed.*, 1989, **98**, 41-46.
41. Kulig, M., Preu, G., Cramer, D. and Lubitz, K., High-performance PZT ceramics from hydrothermally synthesized precursor powders; in Ceramics: Charting the Future, edited by Vincenzini, P., Techna, Srl., 1995, 2493-2498.
42. Kim, S., Lee, G. S., Shrout, T. R. and Venkataramani, S., Fabrication of fine-grain piezoelectric ceramics using reactive calcinations, *J. Mater. Sci.*, 1991, **26**, 4411-4415.
43. Fukai, K., Ueda, N., Hidaka, K., Aoki, M., Abe, K. and Igarashi, H., Easily sinterable $Pb(Zr_{0.53}Ti_{0.47})O_3$ ceramic powder from $(Zr_{0.53}Ti_{0.47})O_3$ solid solution; In Ceramic Transaction, Ceramic Powder Science III, edited by Messing, G. L., Hirano, S. and Hausner, H., The Am. Ceram. Soc. Inc., 1990, **12**, 741-748.
44. Segal, D. L., Chemical synthesis of advanced ceramic materials, Cambridge University Press, U.S.A.. 1989.
45. Geiger, G., Powder synthesis and shape forming of advanced ceramics, *Am. Ceram. Soc. Bull.*, 1995, **74**, 62-65.

46. McNamara, V. M., A wet chemical method for the preparation of oxide mixtures applicable to electronic ceramics, *J. Can. Ceram. Soc.*, 1965, **34**, 103-120.
47. Murata, M., Wakino, K., Tanaka, K. and Hamakawa, Y., Chemical preparation of PLZT powder from aqueous solution, *Mater. Res. Bull.*, 1976, **11**, 323-328.
48. Biggers, J. V., and Venkataramani, S., Preparation and reactivity of lead zirconate-titanate solid solutions produced by precipitation from aqueous solutions, *Mater. Res. Bull.*, 1978, **13**, 717-722.
49. Duran, P. and Moure, C., Sintering at near theoretical density and properties of PZT ceramics chemically prepared, *J. Mater. Sci.*, 1985, **20**, 827-837.
50. Lal, R. and Krishnam, R., Preparation and characterization of submicron reactive PZT powder, *Mater. Sci. & Eng.*, 1987, **96**, L25-L29.
51. Schwartz, R. W., Payne, D. A. and Eichorst, D. J., Precipitation and properties of PZT and PLZT powders; in Ultrastructure processing of advanced ceramics, edited by Mackenzie, J. D. and Ulrich, D. R., John Wiley & Sons, New York 1988, 487-498.
52. Potdar, H. S., Deshpande, S. B., Ramaswamy, V., Godbole, P. D. and Date, S. K., Synthesis of active PZT powders via molecular precursor route, *Ind. J. Chem.*, 1993, **32A**, 1037-1040.
53. Choy, J. H., Han, Y. S. and Kim J. T., Hydroxide coprecipitation route to the piezoelectric oxide $Pb(Zr,Ti)O_3$ (PZT), *J. Mater. Chem.*, 1995, **5**, 65-69.
54. Leong, Y. K., Scales, P. J., Healy, T. W., Boger, D. V. and Buscall, R., Rheology and evidence of adsorbate-mediated short-range steric forces in concentrated dispersions. *J. Chem. Soc. Faraday T.*, 1993, **89**, 2473-2478.

55. Kimura, T. and Yamaguchi, T., Morphology control of electroceramic powders by molten salt synthesis; in *Advances in Ceramics, Ceramic Powder Science*, edited by Messing, G. L., Am. Ceram. Soc., 1987, **21**, 169-177.
56. Faber, M., Lannuth, J. and Greil, P., Preparation and characterization of PZT submicron-powder; in *Ceramic transactions, ceramic processing science and technology*, Am. Ceram. Soc., 1995, **51**.
57. Brinker, C. J. and Scherer, G. W., *Sol-gel science: the physics and chemistry of sol-gel processing*, Academic Press, London, 1990.
58. Ogihara, T., Kaneko, H. and Mizutani, N., Preparation of monodispersed lead zirconate-titanate fine particles, *J. Mater. Sci. Lett.*, 1988, **7**, 867-869.
59. Hirashima, H., Onishi, E. and Nakagawa, M., Preparation of PZT powders from metal alkoxides, *J. Non-Cryst. Solids*, 1990, **121**, 404-406.
60. Zhuang, Z. Q., Haun, M. J., Jang, S. J. and Cross, L. E., Fabrication and characterization of pure homogeneous PZT ceramics from sol-gel derived powders, *Adv. Ceram. Mater.*, 1988, **3**, 485-490.
61. Ostertag, R., Rinn, G., Tunker, G. and Schmidt, H., Preparation and properties of sol-gel-derived PZT powders; in *Electroceramics*, edited by Moulson, A. J., Binner, J. and Morrell, R., Brit. Ceram. Proc., 1989, **41**, 11-20.
62. Wilkinson, A. P., Speck, J. S., Cheetham, A. K., Natarajam, S. and Thomas, J. M., In situ X-ray diffraction study of crystallization kinetics in $Pb(Zr_{1-x}Ti_x)O_3$ (PZT, $x = 0.0, 0.55, 1.0$), *Chem. Mater.*, 1994, **6**, 750-754.
63. Polli, A. D. and Lange, F. F., Pyrolysis of $Pb(Zr_{0.5}Ti_{0.5})O_3$ precursors: avoiding lead partitioning, *J. Am. Ceram. Soc.*, 1995, **78**, 3401-3404.

64. Maher, G. H., Hutchins, C. E. and Ross, S. D., Preparation and characterization of ceramic fine powders produced by the emulsion process, *Am. Ceram. Soc. Bull.*, 1993, **75**, 72-76.
65. Cipollins, N. E., Emulsion-characteristic method for making fine powders, US Patent 4,654,075, March (1987).
66. Laudise, R. A., Hydrothermal synthesis of crystals, *J. Chem. Eng. News*, 1987, **9**, 30-43.
67. Riman, R. E., The chemical synthesis of ceramic powders; in Surface and colloidal chemistry in advanced ceramic processing, edited by Pugh, R. J. and Bergstrom, L., Marcel Dekker, Inc., 1995, 22-62.
68. Nishizawa, H., Yamasaki, N., Matsuoka, K. and Mitsushio, H., Crystallization and transformation of zirconia under hydrothermal conditions, *J. Am. Ceram. Soc.*, 1982, **65**, 343-346.
69. Watson, D. J., Randall, C. A., Newnham, R. E. and Adair, J. H., Hydrothermal formation diagram in the lead titanate system; in Ceramic transaction, ceramic powder science II, edited by Messing, G. L., The Am Ceram. Soc., Inc., Westerville, OH, 1988, **1**, 154-162.
70. Eckert Jr., Hung-Houston, C. C., Gersten, B. L., Lencka, M. M. and Riman, R. E., Kinetics and mechanisms of hydrothermal synthesis of barium titanate, *J. Am. Ceram. Soc.*, 1996, **79**, 2929-39.
71. Ponton, C. B., An overview of hydrothermal and emulsion processing of multiphase ceramic precursor sols; in Third euro-ceramics, processing of ceramics, edited by Duran, P. and Feranadez, J. F., 1993, **1**, 189-194.

72. Ichihara, T., Tsurumi, T., Asaga, K., Lee, K. H. and Daimon, M., Hydrothermal synthesis of PZT crystalline powder and piezoelectric properties of ceramics, *J. Ceram. Soc. Jpn. Int. Ed.*, 1009, **98**, 155-160.
73. Lin, C. H., Pei, S. C. and Chin, T. S., Hydrothermal synthesis of $PbTi_{1-x}Zr_xO_3$ ceramic powder; in *Ceramic Transactions, Dielectric Ceramics: Processing, Properties and Applications*, 1993, **32**, 261-274.
74. Lemoine, L., Leriche, L., Tronic, P. and Thierry, B., Optimization of synthesis parameters of PZT powder through hydrothermal routes; in *Advance in ceramics: Charting the future*, edited by Vincenzini, P. and Technical, Srl., Am. Ceram. Soc. Inc., 1995.
75. Beal, K. C., Precipitation of lead zirconate titanate solid solutions under hydrothermal conditions; in *Advances in ceramics, ceramic powder science*, Am. Ceram. Soc. Inc., 1987, **21**, 33-41.
76. Lee, K. H., Asaga, K., Ichihara, T. and Daimon, M., Synthesis of PZT crystalline powders by reaction of aqueous solution below 200°C, *Yogyo-Kyokai-Shi*, 1987, **95**, 74-78.
77. Dawson, W. J., Hydrothermal synthesis of advanced ceramic powders, *Am. Ceram. Soc. Bull.*, 1988, **67**, 1673-78.
78. Cheng, H., Ma, J., Zhu, B. and Cui, Y., Reaction mechanism in the formation of lead zirconate titanate solid solutions under hydrothermal conditions, *J. Am. Ceram. Soc.*, 1993, **76**, 625-629.
79. Adschiri, T., Kanazawa, K. and Arai, K., Rapid and continuous hydrothermal crystallization of metal oxide particles in supercritical water, *J. Am. Ceram. Soc.*, 1992, **75**, 1019-1022.

80. Kutty, T. R. N. and Balachandran, R., Direct precipitation of lead zirconate titanate by the hydrothermal method, *Mater. Res. Bull.*, 1984, **19**, 1479-1488.
81. Margolis, E. J., Chemical principles in calculations of ionic equilibria, Macmillan, New York, 1966.
82. Fergusson, J. E., The heavy elements: chemistry, environmental impact and health effects, Pergamon, Oxford, 1990.
83. Kiss, K., Mager, J., Vkasovich, M. S. and Lockhart, R. J., Ferroelectrics of ultrafine ceramics I: Synthesis of titanate powders of ultrafine size, *J. Am. Ceram. Soc.*, 1966, **49**, 291-296.
84. Kutty, T. R. N. and Padmini, P., A method for the preparation of high purity lead zirconate titanate solid solutions by carbonate-gel composite powder precipitation, *J. Mater. Chem.*, 1997, **7**, 521-526.
85. Smith, G. D., Caughlan, C. N. and Campbell, J. A., Crystal and molecular structure of di- μ -oxo-bis(diacetylacetone)bis(titanium(IV))-bis(dioxane), $(\text{TiO}(\text{C}_5\text{H}_7\text{O}_2)_2)_2 \cdot 2\text{C}_4\text{H}_8\text{O}_2$, and di- μ -oxo-bis(diacetylacetone)titanium (IV)), $(\text{TiO}(\text{C}_6\text{H}_7\text{O}_2)_2$, *Inorg. Chem.*, 1972, **11**, 2989-2993.
86. Chewasatn, S., Sol-gel synthesis of fibers and films of lead titanate based ceramics, A thesis submitted in accordance with the requirements for the degree of doctor of philosophy, Schools of Materials, The University of Leeds, UK.
87. Hennings, D., Rosenstein, G. and Schreinemacher, H., Hydrothermal preparation of barium titanate from barium-titanium acetate gel precursors, *J. Euro. Ceram. Soc.*, 1991, **8**, 107-115.

88. Ohba, Y., Rikitoku, T., Tsurumi, T. and Daimon, M., Precipitation of lead-zirconate-titanate powders under hydrothermal conditions, *J. Ceram. Soc. Jpn.*, 1996, **104**, 6-10.
89. Sengupta, S. S., Ma, L., Adler, D. L. and Payne, D. A., Extended X-ray absorption fine structure determination of local structure in sol-gel derived lead titanate, lead zirconate and lead zirconate titanate, *J Mater. Res.*, 1995, **10**, 1345-1348.
90. Su, B., Novel fabrication processing for improved lead zirconate titanate (PZT) ferroelectric ceramic materials, A thesis submitted to the Faculty of Engineering, The University of Birmingham, UK.
91. Cousin, P. and Ross, R. A., Preparation of mixed oxide: a review, *Mater. Sci. & Eng.*, 1990, **A130**, 119-125.
92. McColm, I. J., Special ceramics for modern applications: which? why? how?; in Ceramic processing, edited by Terpstra, R. A., Pex, P. P. A. C. and de Vries, A. H., Chapman and Hall, New York. 1995, 1-33.
93. Richardson, D. W., Modern ceramic engineering: properties, processing, and use in design, 2nd ed., Marcel Dekker, New York, 1992.
94. Bortzmeyer, P., Dry pressing of ceramic powders; in Ceramic processing, edited by Terpstra, R.A., Pex, P.P.A.C. and de Vries, A. H., Chapman and Hall, New York. 1995, 102-142.
95. Lewis, Jr., Drying pressing technical ceramics, *Am. Ceram. Soc. Bull.*, 1996, **74**, 103-106.
96. Lin, C.H., Chin, T.S., Pei, S.C., Huang, J.Y., and Li, C.H., PZT ceramics from hydrothermally synthesized powders, *IEEE.*, 1995, 115-117.

97. Cheng, H., Ma, J., Zhu, B., and Cui, Y., Reaction mechanisms in the formation of lead zirconate titanate solid solution under hydrothermal conditions, *J. Am. Ceram. Soc.*, 1993, **76**(3), 625-629.
98. Traianidis, M., Courtois, D., Leriche, A., and Thierry, B., Hydrothermal synthesis of lead zirconium titanate (PZT) powders and their characteristics, *J. Eur. Ceram. Soc.*, 1999, **19**, 1023-1026.
99. Pramanik, P. and Das, R.N., Structure property relations of chemically synthesized nanocrystalline PZT powders, *Mater. Sci. Eng.*, 2001, **A304**-306, 775-779.
100. Deng, Y., Liu, L., Cheng, Y., Nan, C.W. and Zhao, S.J., Hydrothermal synthesis and characterization of nanocrystalline PZT powders, *Mater. Lett.*, 2003, **57**, 1675-1678.
101. Zhang, Y. and Ding, A.L., Effect of La content on characterization of PLZT ceramics, *Mater. Sci. Eng.*, 2003, **B99**, 360-362.
102. Lee, Y.J. and Yen, F.S. Phase-formation mechanism for hydrothermally synthesizing lanthanum-modified lead zirconate titanate powders, *J. Cryst. Grow.*, 1997, **178**, 335-344.
103. Kim, I.W., Lee, D.S., Kang, S.H. and Ahn, C.W., Antiferroelectric characteristics and low frequency dielectric dispersion of $Pb_{1.075}La_{0.025}(Zr_{0.95}Ti_{0.05})O_3$ thin films, *Thin Solid Films.*, 2003, **441**, 115-120.
104. Zhang, N., Li, L. and Gui, Z., Frequency dependence of ferroelectric fatigue in PLZT ceramics, *J. Eur. Ceram. Soc.*, 2001, **21**, 677-681.
105. Filipic, C. and Vodopivec, B., Relaxor and incipient ferroelectric phase in 6.5/65/35 PLZT ceramics, *J. Eur. Ceram. Soc.*, 2004, **24**, 1565-1568.

106. Cerqueira, M., Nasar, R.S., Leite, E.R., Longo, E. and Varela, J.A., Sintering and characterization of PLZT (9/65/35), *Ceram Inter.*, 2000, **26**, 231-236.
107. Las, W.D., Spagnol, P.D., Zaghete, M.A., Cilense, M., Electrical characteriztion of lead zirconate titanate prepare by organic solution route, *Ceram. Inter.*, 2001, **27**, 367-372.
108. Barranco, A. P., Pinar, F.C., Martinez, O.P., Guerra, J.D.L.S. and Carmenate, I.G., AC behaviour and conductive mechanisms of 2.5 mol% PbZr_{0.57}Ti_{0.43}O₃ ferroelctric ceramic, *J. Eur. Ceram. Soc.*, 1999, **19**, 2677-2683.
109. Liu, D., Zhang, H., Wang, Z. and Zhao, L., Preparation and characterization of Pb(Zr_{0.52}Ti_{0.48})O₃ powders and thin film by a sol-gel route, *J. Mater. Res.*, 2000, **15**, 1336-1341.
110. Hardtl, K. H. and Rau, H., PbO vapour pressure in the Pb(Ti_{1-x}Zr_x)O₃ system, *Solid State Commun.*, 1969, **7**, 41-45.
111. Wada, S., Suzuki, T. and Noma, T., Role of lattice defects on the size effect of barium titanate fine particles-a new model, *J. Ceram. Soc. Jpn.*, 1996, **104**, 383-392.
112. Boutarfaia, A., Investigation of co-existence region in lead zirconate titanate solid solutions: X-ray diffraction studies, *Ceram. Int.*, 2000, **26**, 538-587.
113. Menegazzo, B. A. and Eiras, J. A., Preparation of coprecipitated ferroelectric ceramic powders by two stage calcinations, *J. Am. Ceram. Soc.*, 1993, **76**, 2734-2736.
114. Cheng, H., Jiao, J., Ma, J., Zhao, Z. and Qi, L., X-ray analysis of PLZT solid solution formed under hydrothermal conditions, *Chem. J. Chinese Univ.*, 1996, **17**, 1253-1257.

115. Wood, C. W. and Holliday, A. K., Inorganic chemistry, Butterworth & Co, London, 1967.
116. Bassett, J., Denny, R. C., Jeffery, G. H. and Mendham, J., Vogel's textbook of quantitative inorganic analysis, 4th ed., Longman, London, 1978.
117. Rochow, E. G., Modern descriptive chemistry, Saunders Company, Philadelphia, 1977.
118. Shaikh, A. S. and Vest, G. M., Kinetics of BaTiO₃ and PbTiO₃ formation from metallo organic chemistry, *J. Am. Ceram. Soc.*, 1986, **69**, 682-688.
119. Heslop, R. B. and Robinson, P. L., Inorganic chemistry: a guide to advance study, Elsevier , Tokyo, 1960.
120. Ikeda, T., Okana, T. and Watanabe, M., A ternary system PbO-TiO₂-ZrO₂, *Jpn. J. Appl. Phys.*, 1962, **1**, 218-222.
121. Hahn, L., Uchino, K. and Nomura, K., On the phenomenon of morphotropic tetragonal-rhombohedral phase boundary in the ferroelectric ceramics, *Jpn. J. Appl. Phys.*, 1978, **17**, 637-641.
122. Mabud, S. A., The morphotropical phase boundary in PZT solid solution, *J. Appl. Cryst.*, 1980, **13**, 211-216.
123. Ogawa, T., High functional and high-performance piezoelectric ceramics, *Am. Ceram. Bull.*, 1991, **70**, 1042-1049.
124. German, R. M., Sintering theory and practice, John Wiley, New York, 1996.
125. Haertling, G. H., Improved hot-pressed electrooptic ceramics in the (Pb,La)(Zr,Ti)O₃ system, *J. Am. Ceram. Soc.*, 1971, **54**, 303-309.

126. Haertling, G. H., Grain growth and densification of hot-pressed lead zirconate-lead titanate ceramics containing bismuth, *J. Am. Ceram. Soc.*, 1966, **49**, 113-118.
 127. Snow, G. S., Fabrication of transparent electrooptic PLZT ceramics by atmosphere sintering, *J. Am. Ceram. Soc.*, 1973, **56**, 91-96.
 128. Snow, G. S., Improvements in atmosphere sintering of transparent PLZT ceramics, *J. Am. Ceram. Soc.*, 1973, **56**, 479-480.
 129. Takahashi, M., Space charge effect in lead zirconate titanate ceramics caused by the addition of impurities, *Jpn. J. Appl. Phys.*, 1970, **9**, 1236-1246.