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a. Highlights in 2007

Ultrasonic motors and ink-jet heads were developed using lead-free piezoelectric ceramics. These are the first success of piezoelectric actuator applications using lead-free ceramics. Material properties were enhanced by doping iron, copper, lithium and strontium to potassium niobate system. A shear mode driving was employed in these devices to cover low performance of the ceramics.

b. Articles (original article, comment/book)

- 1) T. Tsurumi, J. Li, T. Hoshina and H. Kakemoto, M. Nakada and J. Akedo, "Ultra Wide Range Dielectric Spectroscopy of BT-based Perovskite Dielectrics", *Appl. Phys. Lett.*, 91, 182905 (2007).
- 2) Non-Linear Piezoelectric and Dielectric Behaviors In Perovskite Ferroelectrics, T. Tsurumi, *J. Ceram. Soc. Jpn.*, 115 (1), 17-22 (2007).
- 3) E. Li, H. Kakemoto, S. Wada and T. Tsurumi, "Influence of CuO on the Structure and Piezoelectric Properties of the Alkaline Niobate-based Lead-free Ceramics," *J. Am. Ceram. Soc.*, 90 (6), 1781-91 (2007).
- 4) E. Li, H. Kakemoto, S. Wada and T. Tsurumi, "Effects of Manganese Addition on Piezoelectric Properties of the (K, Na, Li)(Nb, Ta, Sb)O₃ Lead-Free Ceramics", *J. Ceram. Soc. Jpn.*, 115, 250-253 (2007).
- 5) H. Kakemoto, J. Li, T. Harigai, S. -M. Nam, S. Wada and T. Tsurumi, "Reflection Intensity Measurement Using Non-contact Microwave Probe and In-plane Mappings for Dielectric Device", *J. Euro. Ceram. Soc.*, 27 (2007) 2917-2921.
- 6) H. Kinbara, T. Harigai, H. Kakemoto and T. Tsurumi, "Temperature Dependence of Dielectric Permittivity of Perovskite-type Artificial Superlattices" *IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control*, 54 (12), 2541 - 2547 (2007)
- 7) T. Harigai and T. Tsurumi, "Dielectric Properties of Perovskite-Type Artificial Superlattices, *Ferroelectrics*, 346, 56-63 (2007).

c. Presentation in international/domestic conferences

T. Tsurumi and J. Akedo, "Aerosol Deposition Method for Ceramic Thick Film Fabrication at Room Temperature," 11th European Meeting on Ferroelectricity, Sep. 3-6, Bled, Slovenia (2007)

T. Tsurumi, T. Matsuo, T. Hoshina and H. Kakemoto "Size Effect and Dead Layers in BST Thin Films", PacRim-7, Symposium 6, Nov. 11-14, Shanghai, China (2007).