Hiroshi Funakubo, Prof.
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1. Main Research Results
   1) Development of Lead Free Piezoelectric Material
      Additional novel lead-free system was also developed this year based on the same concept developed last year. This indicates that a lot of novel system can be found based on our material design.

   2) Characterization of Polar-axis oriented PZT Thick Films
      Electrical and piezoelectric properties of polar-axis oriented-PZT agreed well with the prediction from the theory. This indicates that the obtained film can be regard as the single crystal.

   3) Growth of Tunable Capacitor
      Material design induced large tunability, i.e. the change of the capacitance with electrical field, was developed.

2. List of Publications (original article, comment/book)
   1) Original Paper


(13)“Thick Epitaxial Pb(Zr$_{0.35}$,Ti$_{0.65}$)O$_3$ Films Grown on (100)CaF$_2$ Substrates with Polar-axis-orientation”, Takashi Fujisawa, Hiroshi Nakaki, Rikyu Ikariyama, Hitoshi Morioka, Tomoaki Yamada, Keisuke Saito, and Hiroshi Funakubo, Apply. Phy. Express. 1 (2008) 085001-1-3


(18)“Langmuir-Blodgett Fabrication of Nanosheet-Based Dielectric Films without an Interfacial Dead Layer”, Minoru Osada, Kosho Akatsuka, Yasuo Ebina, Yoshinori Kotani, Kanta Ono, Hiroshi


(28)“Strain-relaxed structure in (001)/(100)-oriented epitaxial Pb(Zr,Ti)O3 films grown on (100) SrTiO3 substrates by metal organic chemical vapor deposition”, Hiroshi Nakaki, Yong Kwan Kim, Shintaro Yokoyama, Rikyu Ikariyama, Hiroshi Funakubo, Ken Nishida, Keisuke Saito, Hitoshi Morioka, Osami Sakata, Hee Han, and Sungii Baik, J. Appl. Phys., 105 (2009) 014107-1-5

(29)“Domain structure of (100)/(001)- oriented epitaxial PbTiO3 thick films with various volume fraction of (001) orientation grown by metal organic chemical vapor deposition”, Satoru Utsugi , Takashi


(36)“Polarized Raman study for epitaxial PZT thick film with the mixture orientation of (100)/(001).”, Mitsumasa Nakajima, Takashi Fujisawa, Ken Nishida, Takashi Yamamoto, Minoru Osada, Hiroshi Naganuma, Soichiro Okamura, and Hiroshi Funakubo, Key Eng. Mater., In press.

(37)“Effect of incubation time on deposition behavior of Ruthenium films by MOCVD using (2,4-Dimethylpentadienyl)(ethylcyclopentadienyl) Ruthenium”, Masaki Hirano, Kazuhisa Kawano, and Hiroshi Funakubo, Key Eng. Mater., In press.


(40) "Composition dependency of epitaxial Pb(Zr,Ti)O$_3$ films with different film thickness”, Shintaro Yokoyama, Hiroshi Funakubo, Hitoshi Morioka, Keisuke Saito, Tomoaki Yamada, and Mutsuo Ishikawa, Ferroelectrics, in press.


2) Review & Book


(2) “Recent Development of Thin films of Perovskite Oxide”, Hiroshi Funakubo and Tomoaki Yamada, Ceramics, Vol.43 (8) (2008) 634-638


3. Invited/Plenary Talks in Conference

1) International Conference or Workshop


(9) Hiroshi Funakubo, Shintaro Yasui, Keisuke Yazawa, Tomoaki Yamada, Mutsuo Ishikawa and Hiroshi Uchida, "Novel candidate of lead-free piezoelectric materials developed by epitaxial film”, Piezo 2009, Electroceramics for End users IV, 1-4 March, 2009, 1, March, Belvedere Hotel, Zakopane, Poland, I02

2) Domestic Conferences
Total 6

4. Patent
Total 10 (Japan, 2008)

5. Award
Total 8 including
1) The American Ceramic Society, Richard M. Fulrath Award, “Metal-Organic Chemical Vapor Deposition and Property of High Quality Dielectric Thin Films”,
2) Tetsu Miyoshi, The 6th Asian meeting on Electroceramics Young Scientist Awards
3) Masaki Hirano, The 6th Asian meeting on Electroceramics Young Scientist Award
4) Mitsumasa Nakajima, The 6th Asian meeting on Electroceramics Young Scientist Awards
5) Takashi Fujisawa, Best Presentation Awards of Master Thesis.
6. **Others**