

新しいスパッタ堆積モードによる強誘電体(PZT)薄膜の低温形成とその機構解明

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Low Temperature Preparation of Ferroelectric (PZT) Thin Films by New Sputter Deposition Mode and Investigation of Its Mechanisms

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09650349

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Section

一般

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Electronic materials/Electric materials

Research Institution

Kanazawa University

Principal Investigator

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Sputtering / PZT Thin Films / Metallic Mode / Oxide Mode / Isotope Oxygen / ZrTi Target / Metal-Oxide Combined Target

Research Abstract

Origin of oxygens in PZT (Pb(Zr, Ti)O₃) films prepared using isotope oxygen (¹⁸O₂) was investigated by analyzing the mass of oxygens in the films by SIMS technique. For a film prepared by metallic mode it was found for the first time that 90% oxygen in the film was from PbO and the rest 10% from oxygen gas. Thus PbO is the main oxygen source. While, for oxide mode 30% oxygen came from PbO, consequently, oxygen gas was the main oxygen source.

Quantitatively investigating Pb ratio to Zr+Ti in targets, it was found that perovskite films were intended to grow when the ratio was more than 3. This result is recognized that perovskite films grew when oxygen was supplied so as to just satisfy the stoichiometry of PZT. PbO is not necessary to just

supplement its deficiency due to high volatility of Pb. This is a novel view point.
Finally based on results a design method for target of quasi-metallic mode sputter deposition is proposed.

Research Products (12 results)

All Other

All Publications (12 results)

- [Publications] T.Hata et al.: "Proposal of new mixture target for PZT thin films by reactive sputtering" Vacuum. 51. 665-671 (1998) ▼
- [Publications] K.Sasaki et al.: "Origin of oxygen in Pb(ZrTi)O₃ films Prepared by Metal Oxide Combined Target" Vacuum. 51. 661-664 (1998) ▼
- [Publications] 佐々木 他: "金属モードスパッタリングによるエピタキシャル高・強誘電体薄膜の作製" 電子情報通信学会技術研究報告. ED97-214. 17-22 (1998) ▼
- [Publications] K.Sasaki et al.: "Origin of oxygen in PZT Films Prepared by Metal-Oxide Combined Target" Proc.of 4th International Symposium on Spattering and plasma process. 607-612 (1997) ▼
- [Publications] T.Hata et al.: "Propose of New Target for PZT Thin Films by Reactive Spattering" Proc.of 4th International Symposium on Spattering and plasma process. 617-622 (1997) ▼
- [Publications] T.Hata et al.: "Propse of New Mixture Target for Low Temperature and High Rate Deposition of PZT thin Films" Exterded Abstract of Solid State Devices and Materials. 36-37 (1997) ▼
- [Publications] Je-Deok Kim, Kimihiro Sasaki and Tomonobu Hata: "Preparation and Properties of Pb (Zr, Ti) O₃ Thin Films on Ir Electrode Using a Apparatus" Proc.of 5th International Symposium on Sputtering and Plasma Process. (to be published, 1999). ▼
- [Publications] K.Sasaki, W.X.Zhang and T.Hata: "Origin of oxygen in Pb (Zr, Ti) O₃ films prepared by metal-oxide combined target" Vacuum. Vol.51/4. 661-664 (1998) ▼
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