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Preparation of PZT ferroelectric thin films by sol-gel processing

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With the advance of the science and fabrication technology of thin films, ferroelectric thin film materials have a wide application in optics, electrics and space technology. Pb(Zr, Ti)O₃ (PZT) thin films are an important material for preparing ferroelectric random-access memories (FRAMs), piezoelectric sensors, pyroelectric infrared detectors and surface acoustic wave (SAW) devices. Thin films for these applications must have a reproducible exact stoichiometric ratio, homogeneous composition distribution, compact structure and good electric properties. These properties can be obtained in ferroelectric Pb(Zr, Ti)O₃ thin films deposited by sol-gel processing.

In order to prepare Pb(Zr, Ti)O₃ thin films, researchers have adopted many methods, such as electron-beam evaporation^[1], ion-beam deposition^[2], r.f. magnetron sputtering^[3], multi-element metal target sputtering^[4], laser ablation^[5] and sol-gel processing^[6]. This paper reports the preparation and characterization of PZT thin films by sol-gel processing.

Sol-gel processing is an effective chemical method for preparing thin films. Compared to other methods, it has the advantage of simpler composition control, better thin-film homogeneity, lower synthesis temperature, lower cost and easier fabrication of large areas, etc. The lower synthesis temperature is particularly important for lead-based ferroelectric thin films because the lead easily reacts with the substrate or evaporates at high sintering temperatures.

[참고문헌]

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