

3936625 SCAIM: MAJOR: APPLIED ANALYTICAL AND INORGANIC CHEMISTRY;

M. Sc. (APPLIED ANALYTICAL AND INORGANIC CHEMISTRY)

KEY WORDS: PZT / THIN FILM / SOL-GEL / FERROELECTRIC

TAWEESAK SUDYOADSUK: SOL-GEL PREPARATION OF LEAD ZIRCONATE TITANATE (PZT) THIN FILM. THESIS ADVISORS: LADDAWAN PDUNGSAP Ph.D., NOPADOL CHAIKUM Ph.D., PONGTIP WINOTAI Ph.D. 74 p. ISBN 974-664-211-1

Lead zirconate titanate (PZT) thin films were prepared by sol-gel process, using lead acetate trihydrate, zirconium n-propoxide and titanium isopropoxide. 2-Methoxyethanol and formamide were used as solvents. A thin film was obtained by dip coating on Corning microslide and indium oxide (In_2O_3) conducting glass. The Pb excess of 20 mol% was added to PZT stock solution to enhance the formation of the perovskite phase.

The dominant perovskite phase of PZT thin film on glass slide was obtained when annealed at 700°C for 30 minutes. Unfortunately, film cracking and glass softening also took place. Below this temperature, the pyrochlore phase or coexistence of pyrochlore and perovskite phases was observed.

The crack-free PZT film with pure perovskite phase was successfully achieved by the multi-seeding process in which lead titanate (PT) and PZT precursor layers were alternately deposited on the substrate. The formation temperature of the perovskite phase was as low as 500°C . PZT thin film via the multi-seeding process on conducting glass exhibited smooth and dense surfaces. A 580-nm-thick film, annealed at 550°C for 30 minutes showed a dielectric constant (ϵ_r) of 386 at 1 kHz. The remanent polarization (P_r) and coercive field (E_c) values were $19.9 \mu\text{C}/\text{cm}^2$ and 65 kV/cm, respectively. The values revealed that PZT thin film, even on *conducting glass*, shows relatively good ferroelectricity.