3836490 SCAI/M : MAJOR : APPLIED ANALYTICAL AND INORGANIC CHEMISTRY ; M.Sc. (APPLIED ANALYTICAL AND INORGANIC CHEMISTRY)

KEY WORDS : PIEZOELECTRIC / MAJOR CONSTITUENT

CHUTIMON RATANAPEANCHAI : CHEMICAL PREPARATION AND COMPOSITION ANALYSIS OF STRONTIUM DOPED LEAD ZIRCONATE TITANATE. THESIS ADVISORS : LADDAWAN PDUNGSAP Ph.D., JUWADEE SHIOWATANA Ph.D., WARET VEERASAI Dr.rer.nat., 95 p. ISBN 974-661-909-8

The effect of strontium modification on the properties of lead zirconate titanate (PZT 52:48) piezoelectric ceramics was studied. The materials were prepared by co-precipitation chemical method. The calcining condition of strontium-doped ceramics was 800-850 °C for 2 hours. The sintering condition was 500 °C for 2 hours following by 1200 °C for 1 hour. The prepared ceramics were characterized via density measurement, XRD, SEM and optical microscope. The structure of calcined powder and sintered bodies was tetragonal. Some piezoelectric properties were investigated. Dielectric and piezoelectric properties of the PZT were improved upon addition of 2 mol % strontium.

The properties of ceramics are seriously affected by the stoichiometric molar ratio of the major constituent. Therefore, a method for the analysis of ceramic composition was developed to confirm the major constituent of the ceramics prepared. Firstly, the ceramic sample was fused with lithium tetraborate flux followed by dissolution in dilute nitric acid. Secondly, the dissolved sample was tested for lead by flame atomic absorption spectrometry and for titanium and zirconium by visible absorption spectrometry. Polarographic method was also applied for simultaneous determination of the three elements, but this method suffered from matrix interferences. Further study is necessary to reduce the effect of concomitant ion before use with real sample solution.

The PZT's composition found differed from the expected, which was due to the vaporization of PbO during the sintering step and the inaccurate measurement of the titanium content of the starting material used. The Zr:Ti ratios found are quite far from the morphotropic phase boundary region of PZT causing the unsatisfactory electrical properties of the products.