

HYSTERESIS ANALYSIS OF $\text{PbTiO}_3/\text{P}(\text{VDF-TrFE})$ 0-3 COMPOSITES

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Rezumat. *Lucrarea studiază pulberile de titanat de plumb (PbTiO_3) în forma tetragonală, care au fost preparate cu succes prin metoda sol-gel. Producerea ceramicilor de titanat de plumb PT a fost urmata de difracția de raze X (XRD) și microscopie (SEM). Pulberile de titanat de plumb au fost obținute în diferite condiții, funcție de temperatura de ardere și de câmpul ultrasonic. Compozitele $\text{PbTiO}_3/\text{P}(\text{VDF-TrFE})$ au fost realizate sub forma 0-3 pulbere PT și polimer $\text{P}(\text{VDF-TrFE})$ au fost polarizate în ulei siliconic la 100 °C. Analiza histerezisului a fost examinată experimental. Astfel în condițiile procesului sol-gel al pulberii, se poate înțelege mai bine corespondența între proprietățile pulberii și compozitele 0-3, în funcție de tratamentul termic.*

Abstract. *Lead titanate (PbTiO_3) powders in tetragonal form have been successfully prepared by sol-gel method. The processing of lead titanate PT ceramics was followed up using X-ray diffraction (XRD), and microscopy (SEM). Lead titanate powders have been obtained in different conditions function of annealing temperature and ultrasound field. $\text{PbTiO}_3/\text{P}(\text{VDF-TrFE})$ 0-3 composites made by the PT powders and $\text{P}(\text{VDF-TrFE})$ polymer were polarized in silicon oil at 100 °C. The hysteresis analysis has been investigated experimentally. Therefore, one can better understanding the correspondence between the powder properties and the 0-3 composites, function of thermal treatment conditions of sol-gel processing powders.*

Keywords: hysteresis, PbTiO_3 , $\text{P}(\text{VDF-TrFE})$, $\text{PbTiO}_3/\text{P}(\text{VDF-TrFE})$ 0-3 composite

1. Introduction

PbTiO_3 (PT) ceramics were prepared by sol-gel method, utilizing as precursors Titanium (IV) isopropoxide $\text{Ti}[\text{OCH}(\text{CH}_3)_2]_4$, 99.99% purity and Lead (II) acetate trihydrate $\text{Pb}(\text{CH}_3\text{COO})_2 \cdot 3\text{H}_2\text{O}$, 99% purity, and $\text{CH}_3\text{OCH}_2\text{CH}_2\text{OH}$, 2-metoxi-etanol as solvent. Lead titanate ceramics type PbTiO_3 , which exhibits a perovskite structure and high Curie temperature of 490 °C belong to the most important ferroelectric and piezoelectric families. Some of the advantages of sol-gel method are the mixing of reactants on a molecular level, a better control of stoichiometry, higher purity raw materials, and easy formation of ultra-fine and crystallized powders [1]. Ferroelectric ceramics, as lead titanate (PT) show a high electromechanical coupling coefficient, k_t , a large range of dielectric constant

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