

## P-23

Pb(Zr,Ti)O<sub>3</sub> 박막에서 응력이 강유전 특성에 미치는 영향에 대한  
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(LANDAU-KHALATNIKOV SIMULATIONS FOR THE EFFECTS OF STRESSES  
ON THE FERROELECTRIC PROPERTIES OF Pb(Zr,Ti)O<sub>3</sub> THIN FILMS)

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The effects of external stresses on Pb(Zr,Ti)O<sub>3</sub> thin film capacitors were studied with a phenomenological Landau-Khalatnikov equation:

$$\tau \frac{dP}{dt} = - \frac{G}{dP}$$

In this simulation Landau free energy functional ( $G$ ) considering the interaction between ferroelectric polarization ( $P$ ) and external stresses was used to study:

$$G = a_1 P^2 + a_{11} P^4 + a_{111} P^6 + Q_{12} (\sigma_1 + \sigma_2) P^2 - EP$$

As was reported experimentally,[1] remanent polarization and coercive field increased with compressive stress. With tensile stress, however, remanent polarization and coercive field decreased. External stress effects on pulse switching polarization and ferroelectric phase transition temperature will be discussed, too.

[1] W. Lim *et al.* presented in Asian Meeting on Ferroelectrics-3 and will be published in Ferroelectrics.

This work was supported by Korea Research Foundation Grant (KRF-2000-005-Y00070).