

PHOTORESPONSE FROM FERROELECTRIC THIN FILMS/CAPACITORS- POTENTIAL APPLICATIONS*

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NON-INVASIVE photoresponse (photocurrent/voltage and reflected/transmitted light) from ferroelectric lead zirconate titanate thin films, with its strong dependence not only on the remanent polarization but also on the film microstructure, crystal orientation, and nature of the interfaces (state of formation / degradation, etc), offers an ideal "tool" for reading out and probing these ferroelectric capacitors at virtually any stage of fabrication with high spatial resolution (- 100 nm) using beam scanning. This paper will discuss three aspects of such evaluation. First, the transmittance of the film as a function of spectral wavelength will be presented as a direct function of the microstructure of the thin films. Second, the steady photoresponse at 365 nm will be presented as an indicator of the quality of the capacitor in terms of its fatigue characteristics. Third, the high optical E field interaction with the ferroelectric capacitor at high speed reveals a dependence on the crystalline orientation of the film. Combined, these different kinds of photoresponses represent a good signature of the device quality. Moreover, the light exposure leads to a distinct recovery from fatigue of the remanent polarization observed in such memory capacitors.

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