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Developement of dielectric nano-crystal structures for highly sensitive piezoelectric detectors

Nanocrystals made of nonlinear dielectric materials were grown inside alumina nano pores. The nano crystals are characterized by a low dielectric permittivity (such as sodium nitrite, glycine, alanine and lithium sulphate) required for a high detection sensitivity of a small applied mechanical pressure (lower than 1 Pa). The crystals were grown inside alumina nano pores arranged in a highly dense array (1011 pores/cm2) oriented in vertical to the aluminum substrate plane. The pores have a major role in the nucleation and growth of the nano crystals with preferred crystallographic orientations along the longitudinal axis of the pores. The preferred crystallographic orientation of the nano crystals can be controlled and changed by the growth process parameters. The surface morphology, microstructure and composition of the crystals were characterized. The piezoelectric response of the nanocrystals inside the pores was measured at an applied mechanical pressure range of 0.1-100 Pa. The mechanism of nucleation and growth of the nano crystals inside the alumina pores will be discussed. A correlation between the crystallographic orientation of the crystals and their piezoelectric sensitivity will be presented.

Biography

Shlomo Berger has completed his PhD from the Technion Institute of Technology, Israel. He completed one year of a Postdoctoral degree at Harvard University, USA. Since then, he is a Faculty Member in the Faculty of Materials Science and Engineering, Technion, Israel. He has been studying dielectric nano crystals over the past 15 years focusing on pyroelectric and piezoelectric properties of non-linear dielectric nano crystals. His research group developed a unique process of growing low - k nano crystals with preferred crystallographic orientations leading to a highly sensitive detection of heat and mechanical pressure. He presented his research work in many invited talks and reviewed scientific papers.

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