

CHAPTER I

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It has been more than a hundred years since the piezoelectric effect was first discovered by Curie brothers in 1880. Electric charges appear on the surfaces of some crystals when mechanical forces are applied on them. Conversely deformation of crystal takes place under the action of electric field.

The active dielectric including ferroelectrics, electrets are acquiring an increasingly wider importance in present day engineering as the variability of the properties of these materials under the effect of various factors is used in various devices, for instance in many types of radio electronic apparatus.

The material widely used in modern piezoelectric equipments is synthetic piezoelectric system, the so called piezoelectric texture (ceramic) which is a polycrystalline aggregate consisting of ferroelectric crystals whose vectors of spontaneous polarisation are oriented by the external field and retain their orientation after the field is switched off. Barium titanate, a piezoceramic exhibits a number of advantages over the formerly known electric material.

Electrostrictive dielectric under the influence of

appropriate electric fields exhibits elastic properties. Such electrostrictive effect vary as a function of space variables. A piezoelectric body, in general, becomes non-homogeneous when an electric field is applied to it. The non-homogeneity is more pronounced when the body is composed of stratified media. Heterogeneity in the S.I.C. of a composite dielectric is an essential feature. Such composite dielectrics are used in condensers of high capacity.

Considerable interest has been shown in the past in the fabrication of electroacoustical devices and electronic devices as the basic transducing material because of their piezoelectric properties. This interest has been generated by the demands placed on the designer for sophisticated transducers required in high technology industry.

Bimorph, a composite transducing element is often used to reduce mechanical impedance without lowering the output voltage. But for practical purposes, the goal of the designers is to achieve a material of high output voltage with minimum weight for an electro-mechanical appliance. Orchard suggests that the foregoing properties could be well introduced if we form the material in a thin layer using quartz as concrete aggregate. Since the material layers thus formed have varying properties of Quartz crystals, the composite bar is obviously

nonhomogeneous. Moreover, one of the most advantage of forming Piezoelectric Quartz texture in the form of aggregates of any shape is its flexibility for forming in any desired shape by simple technological procedure of casting and grinding.