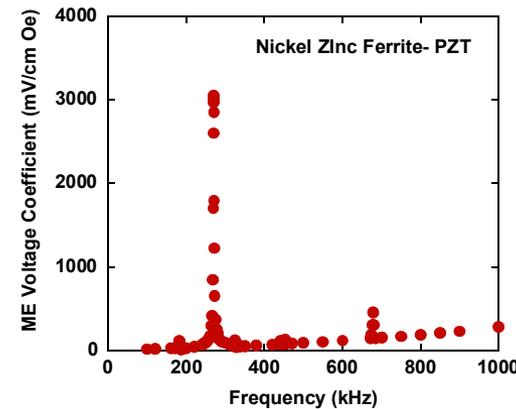
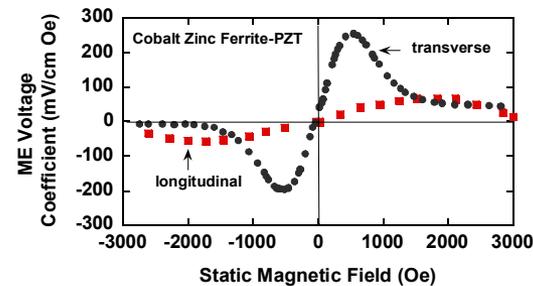


Giant Magnetolectric Effects in Ferromagnetic-Ferroelectric Heterostructures

G. Srinivasan, Oakland University, DMR-0302254

The primary objectives of the research have been observation and theoretical understanding of giant magnetolectric (ME) interactions in composites consisting of ferrites and lead zirconate titanate (PZT). The magnetolectric (ME) coupling is mediated by mechanical stress. Our activities and accomplishments during the first year are as follows. (i) The observation of giant ME effect in ferrite-PZT (Fig.). (ii) Theoretical analysis and estimation of interface coupling. (iii) Studies on resonance ME effects at electromechanical resonance for PZT (Fig.) and ferromagnetic resonance (9-10 GHz) for ferrites.



Giant low-frequency magnetolectric effect (top) and resonance ME coupling (bottom) in ferrite-PZT composites

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Broader Impacts

Education and Research training:

Two high school junior/senior, 3 undergraduates, a graduate student and a research associate are involved in the research. Two undergraduates have completed their education and are joining graduate programs in the fall of 2004. The graduate student is now employed in Delphi Research Laboratory.

Publications and Presentations

Journal Publications: 12

Undergraduate coauthored publications: 7

Conference Presentations: 12

Collaboration:

Academic: (European Scientist)

Professors Bichurin (Novgorod, Russia); Fetisov (Moscow, Russia); Laletin (Belarus).

Industry: (Delphi Automotive, MI)

Joint projects on 77 GHz phase shifter for radars in cars.

Outreach:

Alex Crable and Tejal Patel (High School students) are spending the summer of 2004 in our research projects. Reports are planned for Siemens-Westinghouse and Intel science talent competitions.