Yuan Zhou

Materials Science and Engineering, Virginia Tech
Graduate Student

“Magnetic-Field-Tunable Magnetoelectric Multilayer Piezoelectric Transformer”

ABSTRACT

The piezoelectric transformers (PT) are promising for various applications in backlight inverters, AC-DC converters and power supplies for displays. It has the advantages of high power density, high efficiency, nonflammable and easier miniaturization compared to electromagnetic transformers. However, its working resonance peak is sharp and fixed, limiting the bandwidth of the applications. Thus, a tunable transformer device is necessary in order to shift its resonant frequency and broaden the working bandwidth.

In this study, by taking advantage of the magnetoelectric (ME) effect, a multi-layer piezoelectric transformer combined with Metglas magnetostrictive layers have been fabricated in laminate configuration. The ME transformer was characterized for the shift in the voltage gain/ resonance frequency under constant voltage condition. A dramatic change in the magnitude of the voltage gain/ resonance frequency was observed on application of the external magnetic field. The ME transformer design in this study clearly showed the magnetic tunable feature and possibility of further applications such as the magnetic-field-tunable filters.

BIO

Mr. Yuan Zhou received his B.E. degree in Electronic Science & Technology from Xi’an Jiaotong University in July, 2009. Now he is a PhD candidate in the Department of Materials Science and Engineering at Virginia Tech under Prof. Shashank Priya. His research focuses on designing and synthesizing magnetoelectric composites for on-chip near-resonance applications such as magnetic field sensor, transformer and energy harvester.