

**The 8<sup>th</sup> International Workshop on  
ADVANCED MATERIALS SCIENCE  
AND NANOTECHNOLOGY**

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**ABSTRACT FORM**

(Submission Deadline: **15 August 2016**)

**Title:**                      **High accuracy electronic compass for detecting azimuth direction based on a novel magnetoelectric effect**

**Category**                       Oral presentation                       Poster presentation

**Session:**

1. Materials for Electronics and Photonics (code: MEP)
2. Nanostructured Materials and Devices (code: NMD)
3. Nanotechnology in Life Science and Environment Technology (code: NLE)
4. New Materials for Energy (code: NME)
5. Two-dimensional Hexagonal Semiconductors (code: THS)

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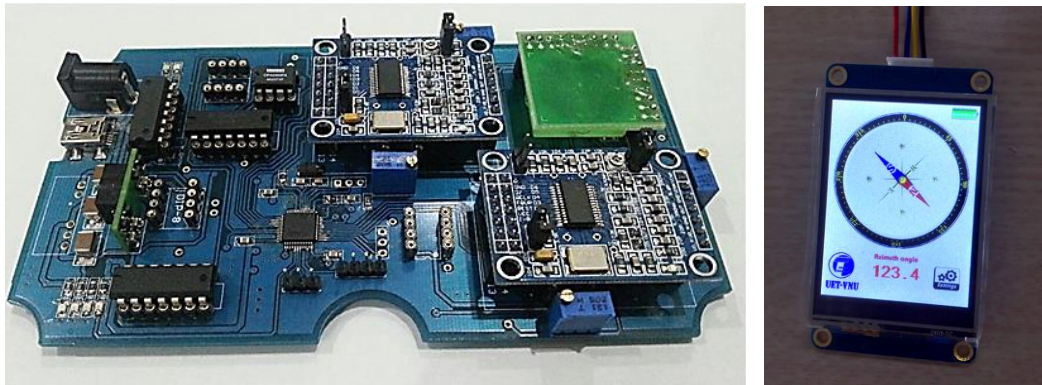
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**Abstract:**

Most navigation systems today use compass to determine heading direction based on determining the earth's magnetic fields in a horizontal plane. There are several types of electronic compasses based on different effects such as fluxgate, magnetoresistive, and magnetoinductive. This paper presents a novel electronics compassing for navigation system, a modification of the conventional magnetic compass, which based on magnetoelectric effect. Recent researches have shown that thanks to enhancement of shape magnetic anisotropy of Metglas ribbon, an high magnetic sensitivity ( $\sim$ Voltage/Tesla), and extremely high accuracy (1 nanoTesla) geomagnetic sensors based on Metglas/PZT magnetoelectric laminate were built [1]. By intergrating 2-axis sensor with an electronic circuit and 12-bit ADC (Fig. 1), a high resolution magnetoelectric compass containing amplification, automatic degaussing, offset cancellation that enables 0.1 degree compass heading accuracy. This kind of magnetoelectric compass would contribute to the most sensitive and high accuracy electronic compass available in the industry today.



*Fig. 1. Photos of the electronic compass based on magnetoelectric effect (a) and LCD display (b)*

[1] D.T. Huong Giang, PA. Duc, N.T. Ngoc, N.H. Duc, Geomagnetic sensors based on Metglas/PZT laminates, *Sensor and Actuator A: Physics*, **A179** (2012) 78-82 (SCI), doi:10.1016/j.sna.2012.03.030