

**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:           **Aspects of nondestructive detections using a  
magnetolectric sensor**

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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## Abstract:

This article deals with the state-of-the-art techniques in the field of nondestructive (and/or distance) detections. Illustrations are described for a wide range of applications from local evaluations of magnetic nanoparticles at a depth of several centimeters in the body during clinical interventions to blood pulse analysis and pipe and cable monitoring. Developments are implemented using a magnetoelectric based magnetic sensor with a long type sandwich Metglas/PZT/Metglas laminate composite of  $1 \times 15 \text{ mm}^2$  dimension. In the resonant mode, the sensor exhibits a sensitivity better than  $200 \text{ mV/Oe}$  and a detection limit of  $3 \times 10^{-8} \text{ emu}$ . This method can detect a spot with at least  $50 \text{ }\mu\text{g}$  iron oxide magnetic nanoparticles at a distance of about  $10 \text{ mm}$  from the skin surface. For the radial pulse analysis, thanks to the disturbance created by blood flowing through a localized magnetic field, not only the information of the heart rate, but also the radial blood flow waveforms are monitored (fig. 1), which strongly supports the traditional Chinese medicine. Moreover, this universal detector type can also be performed for locating wood, metal, copper, iron and live wires in the walls. It is indispensable tools for any contractors in the building who have to drill holes into walls as well as building inspectors who want to making a report on a site. The magnetoelectric sensors, thus, exhibit a high potential of applications.

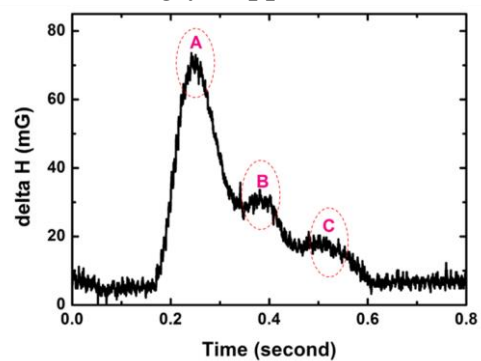


Figure 1. Radial blood flow waveforms