

Study on Metal Core-Assisted Piezoelectric Complex Fiber

In an attempt to develop piezoelectric sensors and actuators for smart boards, complex piezoelectric fibers with metal core were fabricated by hydrothermal method and extrusion method. The insertion of metal core was significant in view that the fragility of ceramics can be overcome and electrodes are not required in the use as sensors and actuators. In order to evaluate the sensing and actuating abilities of these new-type fibers, a cantilever structure was constructed by embedding the fiber into the surface layer of CFRP composite board. In addition, it is shown that this board can make the vibration and detect the vibration.

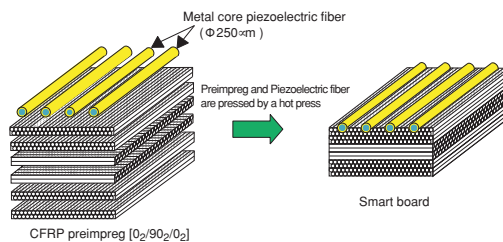


Fig.1 Fabrication process of the smart board

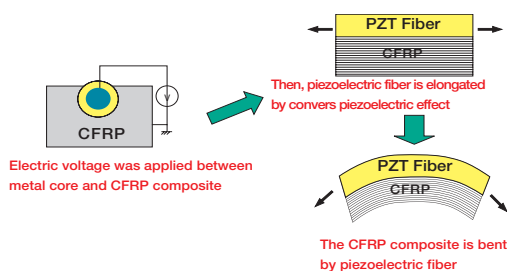


Fig.2 Application to the Actuator

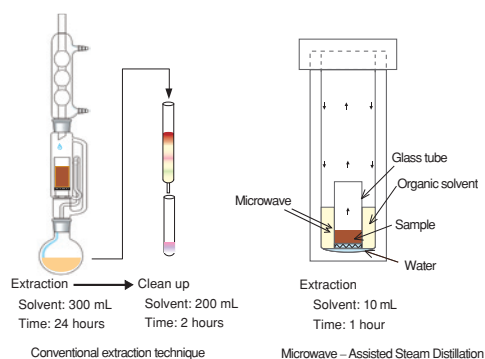
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AIST Today Vol. 3, No.7
(2003) 13

Standards and Measurement Technology

Extraction Technique for Simple Determination of PCBs and Pesticides

Polychlorinated biphenyls (PCBs) and organochlorine pesticides (OCPs) are representative persistent pollutants. We have developed a novel sample extraction technique (Microwave-Assisted Steam Distillation) for PCBs and OCPs analysis. The analytes were effectively vaporized with water vapor which was generated by microwave irradiation. Because only volatile compounds were recovered in the solvent, the obtained extract could be analyzed with gas chromatograph-mass spectrometers without any cleanup process. The technique gave comparable analytical results with the values obtained by other extraction methods. Smaller organic solvent consumption (10 ml or less) and shorter process time (60 min) would be advantages over other methods.



Comparison of Microwave-Assisted Steam Distillation (MASD) and conventional sample pretreatment technique.

In the case of MASD, effective extraction of PCBs and OCPs was driven by water circulation. Water vapor was generated from the microwave irradiated sample, then the condensed water permeated into the sample by capillary action repeatedly. Through this process, PCBs and OCPs carried by water vapor were trapped into the organic solvent without direct contact between the solvent and the sample.

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AIST Today Vol. 3, No. 7
(2003) 8