

APPLICATION OF HOMOGENIZATION METHOD TO PZT LAYOUT PROBLEM WITH ULTRAFINE INK-JET TECHNOLOGY

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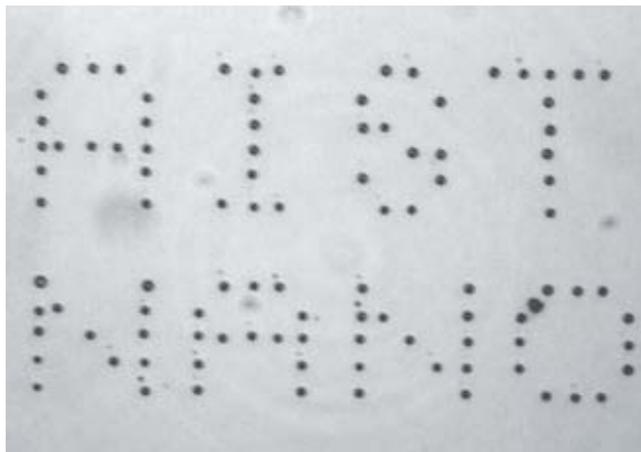
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The ultrafine ink-jet technology developed makes it possible to dispense ultra fine dots with a size smaller than 1/1000 the volume size of dots produced by currently available technology. Printings of a few microns wide ultra fine wiring patterns of silver directly onto the substrate has been successfully carried out by using NanoPaste™ (Harima Chemical Co.), stable dispersion of superfine metal particles. This technology has great benefit to develop piezocomposite materials with high performance. The effective properties of the composite materials depend on the topology of their unit cell (or microstructure) and the properties of their constituents.

To calculate properties of composite materials, global-local approach such as the homogenization method, which is valid for periodic multi-scale structures, is useful. In this study, the homogenization method, based on piezo-electro-elastic FEM, is applied to piezocomposite materials. The results can be used for obtaining optimal design of piezocomposites layout with the ultrafine ink-jet technology. Two dimensional and simple three dimensional numerical examples of piezocomposites composed of PZT and elastic material are presented. Comparison study with experimental results is also discussed.



A example of fine characters using sub-micrometer diameter dots (dot pitch 3-micrometer)

References

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