Here we feature 2 specific activities of projects carried out under the PATENT-DfMM initiative – more will be available in upcoming issues of MST News and our Email newsletter.

Support Project to Sandvik Osprey in use of Controlled Expansion Silicon / Aluminium Alloys for MEMS packaging

This work has been carried out by Lancaster University's Product Development Unit with a specific objective of assisting Sandvik Osprey in entering the MEMS packaging market. Computational models capable of predicting the stresses involved in producing multiple layer assemblies from CE (Controlled expansion) Aluminium/Silicon alloys have been realised.

CE alloys are a product of Sandvik Osprey, and are manufactured by rapid solidification spray forming of Aluminium and Silicon. The effort required to produce these materials is considerable, however the properties of light weight, low Coefficient of Thermal Expansion (CTE) and good thermal conductivity are ideal for packaging of a range of high-power electronics and MEMS technologies where heat dissipation and low expansion are required to protect components. However the brittleness and low CTE of the CE alloys becomes a problem when it is a requirement that they be joined to other materials.

Although at present steps have been taken, and progress has been made, the analysis models produce results that conflict with the result of physical prototype manufacture. Before the extent of the disparity can be ascertained it will be necessary to compare the material properties used with a more complete set of values from the manufacturer. All the tools developed to date are equally applicable to the new models that are needed. As a result, progress can be made without time being spent reproducing existing work. Further progress will now rely heavily on the ability to characterise the as yet undefined, non-linear, material properties such as thermal creep.

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Electrical only testing of MNT based systems

MNT based systems in most cases contain a transducer that interacts with a non-electrical quantity such as pressure, chemical, temperature, motion and electronics for processing. Testing of these devices thus requires the application of this "physical quantity" that is normally expensive and slow hence not practical for mass-produced low-cost devices. This project is investigating the potential for testing these devices using electrical only stimuli applied by either superimposing test stimuli onto the bias signal or modulating the biasing of the device. The work is being carried out by Lancaster University, LIRMM, Montpellier and Qinetiq. To date the technique has been applied to an electro-chemical sensor, a silicon accelerometer and a magnetosensor for embedded compass applications.

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Report: MEMS Summer School, 5-7 Sep, Montpellier, France

The PATENT DfMM Summer School is an annual event which provides training in various aspects of technology related to the manufacturability of MEMS devices and packaging. It also presents a "shop window" for selected research topics undertaken by partners in the PATENT-DfMM Network of Excellence, involving advancements in Design for Manufacturable Micro and Nano Systems. Following an introductory overview of the industry and markets, the programme this year included a case study in Design and Test of MEMS, various sessions on MEMS Modelling and CAD tools, and sessions on Reliability including a major tutorial on Failure Analysis. Initial feedback again seemed positive, and a number of the topics will be developed into more substantial training courses within the PATENT training portfolio over the coming months.

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Information Society Technologies

The NoE Patent-DfMM aims to establish a collaborative team to provide European industry with support in the field of "design for micro nano manufacture" to ensure that problems affecting the manufacture and reliability of products based on micro nano technologies (MNT) can be addressed before prototype and pre-production.

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