

## Design for Micro & Nano Manufacture (DfMM) News

web page: <http://www.patent-dfmm.org>

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*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.



### Flagship Projects to prepare for DfMM Service Clusters of the Future

PATENT-DfMM has launched a number of flagship projects in the second quarter of 2006 with a focus on providing first solutions to key DfMM problems of industry and also to demonstrate the potential of PATENT-DfMM collaborative efforts towards services to industry. First results will be now evaluated; these will constitute key deliverables into the elaboration of the PATENT-DfMM roadmap towards the launch of DfMM Service Clusters in 2007. The following flagship projects are currently running:

#### HUMS - Health and Usage Monitoring MicroSystem

This project focuses on the design, manufacture, package and test for reliability of a series of sensors aimed at monitoring the health and use of operation of larger systems. The initial focus is on aerospace systems through the participation of the SME BCF Designs who specialize in test engineering for aircraft systems. The project will over its life demonstrate how MNT based sensors capable of monitoring a range of "health" parameters can be integrated into key technology platforms or components, powered and networked into aircraft supervisory systems.

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#### BioDrop - Droplet-Based Micro-Electronic Fluidic Operations for Production and Evaluation Platform BioMEMS

The objective of this project is to develop a digital microfluidic platform (using so-called droplets), which is suitable for electrical analysis of biological material, as well as a production platform for peptides. Key to the realisation of this systems and subsequent related products is the realisation of an enhanced design flow that properly addresses reliability, testability and packaging within the design phase. Three European companies will participate, two of which are SMEs, who are involved in these two application areas where the digital droplet platform can be used. A microelectrode Array (MEA) for analysing cell material is already available. Within BioDrop, the latter will be extended with a droplet transport/delivery system.

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#### RELIABILITY - the reliability flagship project is structured into 3 clusters

##### RELMETH - Methodology for accelerated testing and reliability analysis of MEMS

The aim of RELMETH is to prepare the NoE Patent-DfMM for addressing industry requirements on Quantitative Accelerated Life Testing and Reliability Analysis of MEMS. The tool for investigation is the reliability analysis, as developed previously for "classical" devices (ICs, transistors, etc.) and used now for MEMS. The goals of using such analysis for a batch of MEMS are:

- ♦to assess the reliability level of a batch of MEMS;
- ♦to improve the batch reliability by proposing appropriate corrective actions (in design, processes, monitors, etc.);
- ♦to build prediction methods able to foresee the reliability of future batches from the same device, even from the design phase (methods to be used in a Design for Reliability approach).

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#### VIBSHOCK - Holistic Reliability Engineering for MEMS harsh conditions

Reliability issues for MEMS can only reasonably be tackled in a holistic way including package engineering, failure mode modelling and test methodology. This is especially true for MEMS in harsh conditions where sometime packaging is even more prone to failure than the MEMS device itself. The final goal of the VIBSHOCK project is the setup of a self sustainable virtual lab service for reliability engineering of MEMS in harsh conditions. A harsh environment can also be used to accelerate failure mechanisms in MEMS that do not require operation in such harsh environments, but need accelerated reliability test methodology. Also this aspect will be addressed in this flagship project, and should lead to new reliability test methodologies. By multiplying ideas for test methodologies and establishing new testing techniques this project will generate know-how beyond the state of the art.

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#### Package reliability - Integrated Characterisation of Packaging Hermeticity Combining Test, Modelling, Reliability Characterisation and Packaging Integration of a Humidity Microsensor

This project proposes to use a humidity microsensor as a device to demonstrate DfMM; i.e. the design, fabrication, test, characterisation, simulation and packaging of MEMS. The primary objectives of this proposal are:

- ♦To design, fabricate and test a humidity microsensor to electrically detect traces of humidity;
- ♦To characterise, measure and simulate reliability and packaging issues for the integration of the microsensor within a package;
- ♦To analyse reliability and packaging concerns of wafer level packaging technologies for MEMS devices
- ♦To investigate the reliability measurement and modelling challenges associated with humidity, hermeticity and wafer level packaging for MEMS
- ♦To define mechanisms for bringing together partner knowledge obtained from activities and projects undertaken during the first 2 years of the PATENT NoE (across all technical workpackages), to demonstrate DfMM via a specific demonstrator of direct industrial benefit.

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#### PATENT-DfMM/ NEXUS/ MEMUNITY workshop, NEXUS AGM FP7 Workshop, 27-29 Nov 2006, Milan, Italy - Presentations now available

Presentations from the workshop are available from the PATENT-DfMM website free of charge. If you are interested in regular updates from the project, please subscribe to the bi-monthly Email newsletter which is also available free of charge - register on our website!

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