Australian Industry WINS!

WTIA National Diffusion Networks Project (NDNP) funded by the Federal and State and Territory Governments and industry

SUCCESS STORY NUMBER 10: DESIGN AND FABRICATION AT THE MICRO/NANO/BIO INTERFACE – Enabling Technologies for advanced product development in the medical sector

New Technologies

The convergence of enabling technologies, such as micro and nano technology with biology and information technology, promises tremendous advances and potential cost reductions for medical applications and health care in general.

New materials and advanced fabrication technologies are providing opportunities for the development of platforms that exploit this micro-nano-bio interface for a variety of different applications, including medical devices and implants, tools for drug discovery, novel devices for drug delivery, devices for the handling and manipulations of biological material, and advanced bio-sensors for medical diagnostic applications.

In particular, microfluidic technologies - the ability to control and manipulate very small volumes of fluid at the micro and sub-micro scale - are at the heart of a growing number of applications in the medical sector, especially for the realisation of novel "lab-on-a-chip" concepts.

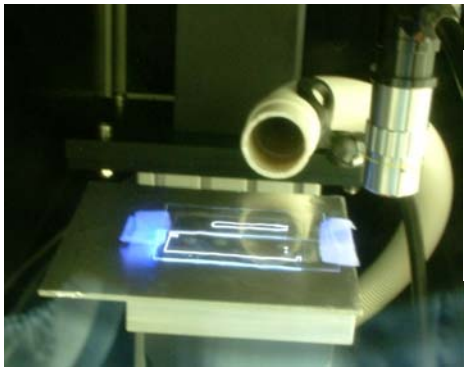
The Need For Low Cost Disposable Microfluidic Components and Devices

For medical applications, polymers are accepted as cost-effective materials for volume production. Melbourne company MiniFAB's approach to the design and fabrication of miniaturised polymer-based fluidic components and devices is based around the stacking and bonding of micro-structured layers of polymers. The application of CNC-controlled micro-structuring techniques with a short turn-around-time, such as laser micro-structuring or micro-milling, in combination with different bonding processes, allows for a fast prototype realisation of test structures and test components.

The emphasis is on the simplified and high throughput manufacturing strategies matched with rapid turnaround development tools. These techniques lead to reduced manufacturing costs, increased product reliability and the development of low cost disposable devices, creating a competitive advantage.

Minichemlab: Making Microfluidics Simple.

One example of a microfluidic product is the MiniChemLAB. This system is a fully integrated and automated work-station dedicated to performing "chemistry-on-a-chip", such as synthesis, screening and other analytical applications. It automates fluidic functions such as flow rate, sequence, volume, temperature, pressure, with the instrument being indispensable for screening multiple reactions, testing different reaction conditions, and using minimal reagent volumes thanks to microfluidic technology. Applications include chemical and biochemical reactions and emulsion fabrication and for other biochemical processes.



Precise laser fabrication of polymer microfluidic chips

Future Developments

The enormous potential for the application of polymer micro and nano systems in the medical sector is just starting to emerge, and offers many opportunities for new product development and for the enhancement of existing methods and procedures. Successful development and implementation demands greater multi-disciplinary interaction and collaboration, with strategic partnering becoming more and more important for businesses.

MiniFab have taken an active role in the WTIA's Medical Devices and Sensors Industry Sectoral Poject, as a host for two of the series of public Technology Demonstrations and Workshops held in Victoria. The local Department of Innovation, Industry and Regional Development, a supporter of the WTIA's NDNP, sees the medical device sector as playing a significant role in their strategy for "Growing Victoria Together".

Michael Wilkinson, Chairman of MiniFAB believes cooperation and networking in projects such as the WTIA's NDNP and business clustering as essential to the competitive development of Australia's specialist manufacturing industries.

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