The GhEbER Lab news

Volume 1 April 2007

Hello all, and welcome to the first edition of the "Levi's Lab" paper.

This will hopefully be a monthly report about what is new in our lab

Presentation day is over

On March 20th, all of the project students participated in a presentation day.
During that day, we gave lectures about our projects, their goals and what have we done so far.
To whom it may concern – the presentation are added (in PDF format, see list below),
And congratulations to everyone on their good grades

Presentations topics:

- Ester&Alva – The Fabrication of a Nano Antibody chip Using NFP on Various Substrates
- Raz - Polymer optics with nano fountain pen for nano biochip application
- Inbal – Enzymatic Nano lithography
- Sivan – Directing of mesenchymal stem cells by substrate morphology

INSIDE THIS ISSUE

Rudi & Daniel are leaving us for a short while

Our nice little office is going to be too empty for a while, since Rudi & Daniel are flying.
Rudi will be leaving us to England, where he is going to work thanks to a scholarship he got. His flight will take place at April 17th, and he will be gone for about a month.
Because of some bureaucratic reasons, Daniel will be leaving us on April 8th, and fly back to France. But then he will hopefully be back as soon as he can.
So Daniel and Rudi, have a nice trip and don't forget to bring us chocolate when you're coming back…

Lab meetings have been scheduled

After a long search for the most convenient time lab meetings are finally scheduled
The lab meetings will be held on
Wednesdays at 2pm

Happy Birthday to Ester

Ester has just celebrated her 26th birthday.
Ester – we wish you Mazal Tov and a happy birthday

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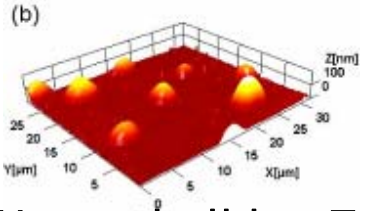
Rudi's paper published

Rudi's paper (in collaboration with former lab member Anne-Sophie) was recently accepted to APL (Applied Physics Letters). Well done Rudi! We're proud.
Here attached a short summary of Rudi's paper. Enjoy everyone!

Micro- and nano-biochips (arrays of sub-micrometer dots of biological molecules) are an area drawing considerable recent interest, as miniaturization of biochips is expected to tremendously increase their portability, thus expanding the use of these arrayed biosensors to point-of-care clinical testing, environmental monitoring, security, etc. In biosensors, a chemical or physical signal is generated upon the binding of the target analyte to a recognition element. A transducer then translates this signal into a quantifiable output signal. The recognition elements in biosensors are in most cases bio-macromolecules such as enzymes or antibodies. However, these molecules are far from perfect for this type of application: they are unstable out of their native environment and moreover, a natural receptor for the particular target analyte of interest may not always exist. Thus, researchers have long sought the creation of tailor-made receptors for a desired molecular target. One surprisingly simple way of generating artificial macromolecular receptors is through the molecular imprinting of synthetic polymers. Here, the target molecule (or a derivative thereof) acts as a molecular template around which interacting and cross-linking monomers are arranged and copolymerized to form a cast-like shell. After polymerization and removal of the template, binding sites complementary to the target molecule in size, shape, and position of functional groups are exposed and their confirmation is preserved by the cross-linked structure. Thus, the polymer is now capable of selectively rebinding the target. For multi-sensors and biochips, MIPs have to be patterned on surfaces and interfaced with a transducer. It should be possible to apply standard micro-spotting techniques such as, inkjet printing or mechanical micro-spotting, to the deposition of MIP arrays on a surface. For example, arrays of silicon micro-cantilevers have been used to deposit bio-molecules onto glass slides. Depending on the solution to be deposited, the surface and the cantilever, the diameter of the dots can vary but is normally in the 10-100 micrometer range. For smaller dots, it should be possible to use techniques like dip-pen nanolithography (DPN), or the nano-fountain pen (NFP). These are scanning probe microscopy techniques that have been shown to be very useful in creating nano-scale patterns of bio-molecules due to their high spatial precision. DPN consists of the dipping of an atomic force microscope (AFM) probe in an "ink". The ink is transferred to the substrate by capillary transport. Inks such as proteins, polymers, DNA and active enzymes have been used to create nanometric patterns. With NFP, AFM tips are replaced by cantilevered nano-pipettes. The pipettes are filled with the solution to be deposited through the back, and the liquid is running to the tapered tip by capillary forces. However, it does not flow out from the tip due to its surface tension. When the pipette is placed in contact with the surface, depending on the compatibility of the two, the liquid is flowing out and minute amounts of liquid are deposited, thus creating structures of below μm size. NFP has been used to deposit proteins, active enzymes, DNA and polymers.
To summarize, we have demonstrated the feasibility of creating nano-structures of molecularly imprinted polymers, consisting of dots and lines, using nano fountain pen. In order to prove the specific binding abilities of the MIP spots fabricated this way, we imprinted a fluorescent molecule and created larger structures, allowing easy direct fluorescence observation, and avoid the need for complex transduction systems. We believe that this technique has a strong potential for the fabrication of highly integrated bio-mimetic microchips as well as other types of integrated biosensors.



Happy holiday To Everyone

See you on wednesday…