

Project Newsletter

BACTOCOM



January 2011

www.bactocom.eu

Project Update and Achievements

Happy New Year, and welcome to the second edition of the BACTOCOM newsletter.

This month will mark the first birthday of the project. We have passed several milestones, some of which are highlighted in this issue and project members have also been involved in a number of related activities, such as appearances

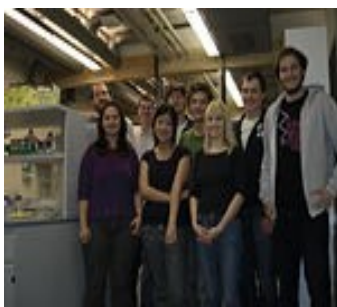
in the press, attendance at conferences, and participation in competitions.

The project infrastructure is now completely in place, and we are well positioned to build on our achievements so far.

“BACTOCOM, a project funded by the European Union to develop a biochemical computing device.”

Quotation from *New Scientist* (see page 4 for details)

iGem success!



Congratulations are due to Andrea Meyer, who led an interdisciplinary team from TUM to a gold medal in the 2010 [International Genetically Engineered Machine](#) (iGem) competition.

The 2010 Jamboree was held at MIT on 6th to 8th November 2010.

The aim of iGem is for teams of students to build biological systems and operate them in living cells.

The students are given a kit of parts and use this, as well products of their own design, to build these systems.

130 teams participated in the 2010 competition; TUM's project involved programming cells by using AND/OR/NOT switches based on predictable logic gates of RNA.

The team completed the first step, designing and building a switch that can be toggled by an RNA molecule.

Further information can be found at the group's web page:

http://2010.igem.org/Team:TU_Munich

For further information about BACTOCOM, please contact Zarka Khan in the first instance on z.khan@mmu.ac.uk or 00 44 (0) 161 247 2813



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Work Package Updates and Achievements

Over the course of this first year of the project, several significant milestones were achieved.

The research team led by Alfonso Jaramillo from UEVE, Evry are responsible for WP2 of BACTOCOM, Intra-cellular Logic.

The node's first milestone was achieved by November 2010, engineering a library of promoters. The team now have over fifty promoters, a presentation of which was given in Santander in October.

Further work from the team included work towards engineering of a digital comparator device, an essential component for drawing together the work of the different work packages including increasing the stability of the plasmids (work of which is detailed below).

Fernando de la Cruz, together with Mapi Garcillán and other team members from the Universidad de Cantabria (UCANT), have engineered replication plasmids that are bio-brick compatible in the earlier

stages of the project for their Work Package on Cell-Cell Interface.

Part of the group's aims are also to design and construct a multichannel conjugation system. There is interconnectiveness here between the Computational Modelling work package (as detailed below).

The Computational Modelling attempts to imitate *in silico* the lab work being implemented by Intra-Cellular Logic (WP2) and Cell-Cell Interface (WP4). It will also inform predictions of population behaviour.

Alfonso Rodríguez Patón, the WP leader for Computational Modelling (WP5), is working with an ever growing research team with members based in both Spain and the UK. A network simulator was recently implemented as the first of the group's milestones.

One of the project's German based partners, CHARITI, are working together on designing a 24 hour clock that is able to oscillate (WP6). This group is led by Nils Blüthgen.

The second of the project's German based partners, TUM, are designing a genetic switch to turn on and off the repressing device (tETR) as part of their work on Intra Cellular Input/ Output (WP3). This group is led by Fredrich Simmel.

“Using mathematical modeling, we were able to reproduce quantitatively the experimentally observed phosphorylation dynamics of the KaiABC clockwork *in vitro*.”

Quotation from paper published in *Molecular Systems Biology* (see page 4 for details).

IMEC results with industry



IMEC, one of the BACTOCOM partners, performs world leading research in nanoelectronics. IMEC are contributing towards two of the WPs, Application Development and Computational Modeling. Below are details of some of IMEC's recent results with industry.

Breakthrough towards lab-on-chip system for fast detection of single nucleotide variations in DNA

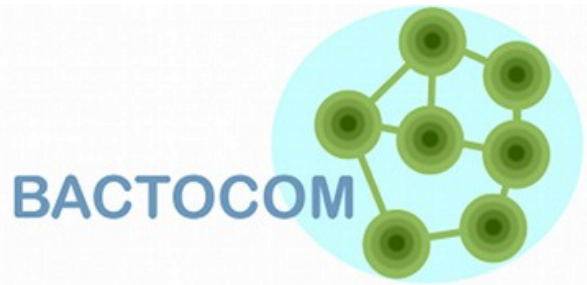
09/12/2010

San Francisco, US – IEDM – December 8, 2010 – Panasonic, core partner within imec's Human++ program and imec today present at the International Electron Devices Meeting in San Francisco various critical components of a biomedical lab-on-chip sensor enabling fast detection of Single Nucleotide Polymorphisms (SNPs) in DNA, such as a miniaturized pump for on-chip generation of high pressures, a micro pillar filter optimized for DNA separation achieving world-record resolution, and a SNP detector allowing on-chip detection using very small sample volumes.

Full release: http://www2.imec.be/be_en/press/imec-news/archive-2010/dnasensordm.html



Recent appointments and visits



The success of the BACTOCOM project is dependent upon 'work at the bench' and the role of research and technical staff is therefore fundamental.

Many of the partners involved in the project have recently appointed Ph.D. students, in addition to technical and Post Doctoral staff, some of whose roles are core or part funded by the project.

Ángel Goñi Moreno, Post Doctoral Research Associate joined MMU in November 2010 and will be investigating Computational Modelling.



At UPM, Adrián Ayala is a recently appointed Ph.D. student.

He joins Alfonso Rodríguez Patón and Petr Sosik at the *Grupo LIA* in Madrid, investigating Computational Modelling.

Since December 2010, two new Ph.D. students, Korbinian Kapsner and Maximilian Weitz, have joined Andrea Meyer and Fredrich Simmel in contributing towards the project at TUM. This follows on from the Simmel lab's recent move (see page 4 for further details).

In addition, three new PhD students have started within the Novel Computation Group at MMU.

They are Ben Holland, Matthew Crossley and Henry Dorian. They are investigating hardware based computational biology, bio-inspired computing and pseudo hierarchical graphs respectively.



Jesús Miro, visiting Ph.D. student at MMU from UPM Jan to June 2011.

Another personnel addition for the group is Andrea Muckhl, a Biotechnologist who started with the Simmel lab just before Christmas.

Announcements and upcoming events



COBRA Project Kick Off

www.cobra-project.eu

The COBRA project is a recently announced Coordination Action, funded by the Seventh Framework Programme.

The main objective of the project is to act as a unifying focus for bio-chem IT. This will be achieved by establishing and maintaining a living roadmap; and high quality channels of communication (including a dedicated website, newsletter, online networking and mailing lists).

The project will also provide support for meetings and exchanges related to bio/chem IT.

The project consortium members are MMU (as project coordinator), the University of Southern Denmark (SDU), Friedrich Schiller Jena (FSUJ), Ruhr University Bochum (RUB) and the Università Ca' Foscari di Venezia (UNIVE).

On **January 20th and 21st**, project participants will meet at MMU for the Project Kick Off.

Key project dates:

April 14th and 15th 2011

Project Meeting at CHARITI, hosted by Nils Blüthgen.

May 4th to 6th 2011 (banner above)

FET Conference in Budapest

<http://www.fet11.eu/>

Publications and Press



Ilka Axmann *et al.* produced a paper on the node's work on the Circadian clock. This paper was published in *Molecular Science Biology* and can be accessed here:

<http://www.nature.com/msb/journal/v6/n1/full/msb201044.html>

Ángel Moreno and Martyn Amos presented a paper at the Alife XII conference in Odense, Denmark in August 2010, which can be accessed here:

<http://mitpress.mit.edu/books/chapters/0262290758chap38.pdf>

Alfonso Jaramillo, Natalio Krasnogor (a member of BACTOCOM's International Advisory Board) *et al.* produced a summary paper on the activities of and recent papers in Synthetic Biology in Europe, which can be accessed here: <http://www.springerlink.com/content/n2w430717vg5306r/fulltext.pdf>

In press coverage on work related to the project, Fernando de la Cruz and Mapi Garcillán (Post doctoral Researcher in the De La Cruz lab) featured in *Diario Médico* in November 2010 in an article concerning the important role of plasmids in the transferring of DNA in bacterial environments. Article (in Spanish) can be accessed here:

<http://intergenomics.blogspot.com/2010/11/diario-medico-el-mundo-bacteriano-es-un.html>

In the same month, Martyn Amos was quoted in *New Scientist* in an article about bacterial conjugation:

<http://www.newscientist.com/article/dn19733-problemsolving-bacteria-crack-sudoku.html>

Keep checking the *News* page on our website for the latest updates.

New premises for the Simmel lab....



The research group from Technische Universität München (TUM), led by Fredrich Simmel, moved into the new Centre for Nanotechnology and Nanomaterials (ZNN) at TUM in Garching (pictured above).

Feedback from latest meetings and events

The last **project meeting** was held at the Universidad de Cantabria in Santander, Spain in October 2010.

This was hosted by Fernando de la Cruz, the Work Package Leader for Cell-Cell Interface.

The project meeting was open to all participants and therefore a good opportunity to gain feedback from all of the project's work package activities.

In January 2011, the majority of the WP leaders will meet at MMU in Manchester.

The International Conference on Synthetic Biology was held at Genepole at UEVE in December 2010. Various BACTOCOM partners were in attendance.

Chaired by Alfonso Jaramillo, WP leader for Intra-Cellular Logic, the conference involved speakers giving different approaches on Synthetic Biology in three areas: Bottom Up, Top Down and Cell-Free.

Also in attendance was Alfonso Rodríguez Patón, the project WP leader for Computational Modeling from UPM.



Alfonso Jaramillo gave a talk entitled, '*Computational Engineered Oscillators.*'

Thomas Landrain, a Ph.D student working in Alfonso Jaramillo's lab, gave a talk entitled, '*Engineering and delivery of complex gene networks for tissue differentiation in human stem cells.*'