

INSIDE IBEC

The newsletter of the Institute for Bioengineering of Catalonia

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Running for charity page 5

A flying start for the JGLs

In September, the three candidates selected by the International Scientific Committee for IBEC's new Tenure Track scheme started in their new capacity as Junior Group Leaders.

Eduard Torrents, Elisabeth Engel and Pere Roca-Cusachs were selected on the basis of the scientific quality and feasibility of the projects they proposed, as well as the potential impact of their research. Other factors considered included the added value offered by the new projects to the current IBEC research programme, and the ability of the selected candidates to carry out efficient group leadership and management.

The Tenure Track process will last four years, during which the resources available to the Junior Group Leaders will be laboratory space, an internal budget, and all the support that full Group Leaders receive from IBEC.

At the end of the third year, the Junior Group Leaders will be evaluated by IBEC's International Scientific Committee. A positive evaluation, taking into account a further five-year project proposal, will allow the candidate to become a full Group Leader. //



Elisabeth Engel

Previously: Senior researcher in the Biomaterials for Regenerative Therapies group

Calcium Sensing Receptor as a Target in Healing Therapies

Elisabeth's tenure track project will develop biomaterial scaffolds that release calcium ions or agonist to activate regeneration processes through a target receptor called the calcium sensing receptor.



Pere Roca-Cusachs

Previously: Senior researcher in the Cellular and Respiratory Biomechanics group

Mechanical communication in cells: molecules, mechanisms and physical constraints

Pere's tenure track project will study the physical and molecular mechanisms by which cells detect and respond to forces, which determines how they proliferate, differentiate and move, and regulates development, tumorigenesis or healing.



Eduard Torrents

Previously: Senior researcher in the Microbial Biotechnology and Host-Pathogen Interaction group

Antibacterial therapies: identification of new targets, efficient drug delivery and development of new diagnostic tools

Eduard's junior group will explore the use of ribonucleotide reductases as an antimicrobial target as well as the synthesis, screening and delivery of new specific enzyme inhibitors.

Thumbs up from La Caixa

IBEC's institutional project 'Sistemes de diagnòstic i teràpia basats en la integració de noves tecnologies nano bio info i cogno' gained a positive review in an assessment meeting with funders Fundació La Caixa on 22nd October.

The project, which has just completed its first year, provides the 'Strategic Research Innovation Initiative' (SRI²) within which IBEC's three 'flagships' – Nanomedicine, Cell Engineering and Intelligent Healthcare – will frame their interdisciplinary projects.

The two-year grant from Fundació La Caixa is under a pilot initiative to fund diverse types of institutional projects or schemes. Other institutes receiving support are ICIQ, ICFO, CRG and IRB. //



Left: the FibroGel consortium

A fitting end for FIBROGEL

A multinational EU-funded project coordinated at IBEC by group leader George Altankov had its final meeting during the summer.

'Bioinspired Nanofibrous Gel for Tissue Engineering of Cartilage and Bone' (FIBROGEL), which was funded by the EU's European-Latin American

Network for Science and Technology (EULANEST), aimed to design an implant with unique properties able to influence localised tissue regeneration.

The project successfully developed a biomimetic nanostructured material consisting of randomly oriented nanofibres – which support osteogenic differentiation – and gel, which proved to be completely biocompatible. The project's results could represent a radical step in treating injury or diseases such as osteoarthritis and osteoporosis, and an international publication is in preparation.

FIBROGEL was one of just 7 projects selected from 65 submitted to EULANEST, an initiative aiming to promote and coordinate cooperation in science and technology between EU member states and Latin America. Its consortium included groups from Brazil and Argentina. //

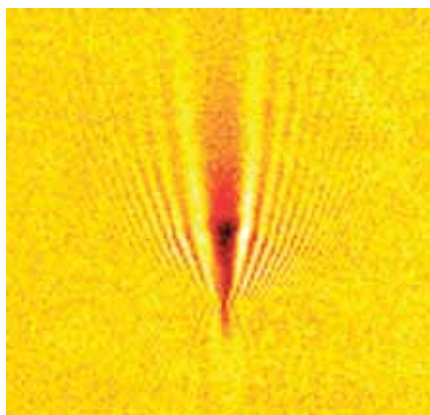
SCIENTIFIC NEWS

Imaging the activity of single nanoparticles

An IBEC researcher and his collaborators published work in *Nature Nanotechnology* in August that outlines a new way to characterize and improve nanoparticle catalysts.

Nanoparticle catalysts, which play essential roles in biomedicine, industry and everyday life by affecting the rate at which chemical reactions take place, are used in making polymers and biofuels, synthesising new drugs, pollution control devices and fuel cell technology. Both characterising them and finding more effective ones is vital, and IBEC senior researcher in the Nanoprobes and Nanoswitches group, Ismael Díez-Pérez – in collaboration with researchers at Arizona State University's Biodesign Institute – revealed a new way to measure the catalytical reactions of single nanoparticles, as well as multiple particles printed in arrays.

"Most catalytic materials made in labs contain varying nanoparticles with different electrocatalytical activities, but until now it has only been possible to measure the average properties across all of them, and not the properties of individual particles,"



Ismael explains. "If we can measure single nanoparticle catalytical reactions, we can figure out how the size, crystal orientation, and composition of the nanoparticle relates to the efficiency of a catalytical reaction, as well as imaging whole arrays of such reactions, which may be used for fast screening."

In the study, nanoparticles are investigated using a new technique previously developed by the Arizona group, plasmonic electrochemical imaging. This works by

optically imaging electrochemical reactions based on surface plasmon resonance, a detection process that occurs when a polarized light hits a prism covered by a thin metal layer. "Basically, we measure electrochemical reactions not by looking at the electrodes, but by concentrating on the reactions near them," says Ismael. "These cause changes in light reflectivity, which the new technique converts to an optical image."

Using the technique, the researchers were able to investigate individual nanoparticles, which appear as spots on an array that emerge over time as the potential changes. Results showed that electrocatalytic current increases proportionally with nanoparticle density. The scientists were also able to study the electrocatalytic activity of platinum nanoparticles printed in a microarray, showing for the first time the feasibility of high-throughput screening of catalytic nanoparticle activity.

The fast, non-invasive new technique also shows promise for the search for new catalysts, and may be applied in other areas where conventional electrochemical detection methods are currently used. //

Latest publications on www.ibecbarcelona.eu: Calò, A. et al, *Soft Matter* • Gramse, G. et al, *Appl. Phys. Lett.* • Ziyatdinov, A. et al, *Sensors and Actuators B: Chemical* • Cendra, M.D. et al, *PLoS ONE* • Redondo, L. et al, *Langmuir* • ...and more!

CASEIB success

The Biomedical Signal Processing and Interpretation group had reason to celebrate at the 30th Congreso Anual de la Sociedad Española de Ingeniería Biomédica (CASEIB 2012) meeting in San Sebastián in November. Firstly, group leader Raimon Jané was elected as President of the Sociedad Española de Ingeniería Biomédica (SEIB) for the next four years. Secondly, PhD Student Oiane Urrea was awarded 3rd prize for students' contributions to science for her paper "Beyond the reach of AHI: identifying key markers for improved systematic diagnosis of SAHS". It's the second year that a member of Raimon Jané's group at IBEC has received the prize, as last year Leonardo Sarlabous was the lucky winner.

Benvenuti a Barcellona!

Members of the Italian nanotechnology innovation cluster NANOXM paid a visit to IBEC on 30th November as part of a study visit to Barcelona aimed at exploring nanotechnology collaborations with Catalan research groups and companies.

The 26 Italian visitors, who included entrepreneurs as well as researchers, enjoyed a general presentation about IBEC, a more specific introduction to its nanobioengineering research from senior researcher Mateu Pla. In their four-day tour of Barcelona's nanotech bodies, the representatives of prestigious Italian centres such as the Università di Siena and the Scuola Normale Superiore's Laboratorio NEST also had a chance to promote Tuscan experience in the advancement of nanotechnology at other centres including ICFO, CIN2 and ICN. //



Life after IBEC

InsideIBEC caught up with former group leader Damien Lacroix, who took up a new position as Professor of Mechanobiology at the University of Sheffield in March, and asked: how are things in the UK?

“Different!” says Damien, and he’s not just talking about the lifestyle, although “people start work earlier, the lunch break is shorter, and they go home earlier. They also don’t sit on terraces, for obvious reasons!”

But the main difference IBEC’s former Biomechanics and Mechanobiology group leader has noticed since starting his new job has been in the academic culture. “The UK higher education system is clearly the best in the world after the USA, and you can notice

it immediately,” he says. “The research is very dynamic, and there is more pressure to get grants and make an impact. There’s more professionalism and efficiency than in Spain. On the other hand, there’s no civil servant status, so potentially anyone can be fired in three months: that doesn’t sound so positive, but it does mean that people try to always do the best job they can.”

However, he does miss the ‘light touch’ of the administrative approach of IBEC, Sheffield being so much bigger and more bureaucratic, and he also misses the “more

“Leading a group as an independent scientist at IBEC was an invaluable experience”

social attitude” in Spain. But Damien’s ties to Barcelona and IBEC are still strong. “One of my greatest satisfactions was to be able to leave some continuity at IBEC,” he says. “I reached an agreement to remain coordinator of the MySpine project in Sheffield but keep some of the administrative and technical activities at IBEC. So I

will naturally continue to work with Jérôme Noailly (senior research associate heading the Biomechanics and Mechanobiology group), and I’m also hoping to continue my other collaborations with Josep, Elizabeth, Xavi and Daniel. However, I’m of course planning to use new internal collaborations at Sheffield to define new areas of research.”

As far as the working day is concerned, most of Damien’s time is devoted to research, as it was at IBEC, but with a few new responsibilities. “I teach for two hours a week, but I have to take part in various teaching committees and in tutorials with students as well,” he says. “I also participate in the strategic direction of the department, as well as being part of the executive board of Sheffield’s INSIGNEO Institute for *in silico* Medicine, where I contribute to shaping this new institute. So my responsibilities have increased considerably.”

Damien’s new group currently has two postdocs, four PhD students and six master students. “All are new except Sara Barreto, who came from IBEC,” he says. “Cecile Perrault, also from IBEC, now has an academic position as lecturer to become an independent scientist.”

He takes away good memories of his time here. “Leading a group as an independent scientist was an invaluable experience,” he says. “During my time in Barcelona I managed to put the city on the map of biomechanics in Europe, and I’m glad that Jérôme will be able to pursue this legacy.” //

Still going strong

In spite of all the changes, the Biomechanics and Mechanobiology group at IBEC is going strong, with senior research associate Jérôme Noailly now at the helm. “PhD students Andy and Andrea graduated this year and will stay on as postdocs, and students Themis and Carlo are halfway through their PhDs,” Jérôme says. “We also have some students at pre-PhD stage, and plenty of interns!” Earlier in the summer, the entire group took part in a course on open-source finite element codes (pictured far right).

Jérôme himself has been busy with his responsibilities as IBEC delegate of the Virtual Physiological Human (VPH)

Institute for Integrative Biomedical Research, which involved taking part in a Study Group in May, and as work package leader for model integration tasks in the MySpine project. In addition, MySpine recently launched a professional short video (above) to explain the project to a general audience. The video, which was produced with the help of former project manager Robert Fabregat and the IBEC Communications team, can be viewed on the new IBEC YouTube webpage (see page 7).



“While we’re ensuring the continuity of the Biomechanics and Mechanobiology group at IBEC, this new era also allows us to branch out in new directions,” says Jérôme. “In particular, we’ll be exploring a systems biology and multiscale approach, as well as consolidating interactions with other groups here at IBEC.” //

INTERVIEW



When Douglas Clift arrived at IBEC straight from Vermont in September, the first thing to strike him – other than Barcelona's lovely weather – was the open-plan laboratory. "We don't have that in the United States," he explains. "The labs are all separate, and the offices are generally in a different place entirely. The fact that many of us are in the same big space at IBEC really encourages collaboration and the sharing of ideas."

American Doug, 22, who graduated in biomedical engineering this year, is staying for a year in the Biomaterials for Regenerative Therapies group to explore his interest in more bioactive materials for bone regeneration, having completed a project using titanium last year. "My professor in the U.S. was collaborating with IBEC, so I had a browse around the website and saw that

Culture shock

The Biomaterials for Regenerative Therapies group has seen many international comings and goings in recent months, with members leaving to far-flung lands and being replaced by newcomers from even further away. *InsideIBEC* picked on one of them to tell us his first impressions of life and science in Barcelona...

Josep's group was doing things along the lines of what I wanted to do," says Doug, who was lucky enough to come with his own money from a fellowship.

Although he's a long way from home, Doug already feels settled in Barcelona, but there are still some things that have been surprising. "The only other place I have lived apart from the U.S. was Sydney, Australia, so the language issue here feels like a major change," he says. "I came ready to practice my Spanish, but the presence of Catalan in Barcelona means I have to work harder than I expected to learn it."

On the research front, Doug notices some other major differences. "In the U.S. there are no independent research institutes as such, as everything is always under the control of a university," he explains. "Also, all the researchers there are professors too, and are expected to take on many extra responsibilities such as serving on committees. Here, you have the option to

just concentrate almost entirely on your research."

Doug's not sure yet what he'll do when his time at IBEC is up, but is fairly certain he'll go on to do a biomaterials-related PhD – assuming all goes well here. "Ask me again next year!" he laughs. //

Just the job



>> Getting the best young researchers – be they from here or abroad – to apply to IBEC is a competitive business, so every year the HR department pinpoints careers fairs to attend. There, they maximise IBEC's visibility with a stand and information materials including the PhD brochure and Annual Report, and give advice and tips to potential applicants. In recent months they attended the UB's Faculty of Physics and Pharmacy careers days in May and the Federació Europea de Societats de Neurociències (FENS) forum in July.



Catch me if you can

A game group of IBEC women gathered for the third consecutive year to take part in the Cursa de la Dona (Women's Race) in Barcelona city centre on 28th October.

Proudly wearing their IBEC scarves, the runners (and walkers) joined 15,000 other women to complete the 8th edition of the race, which raises money to fight breast cancer.

Congratulations to Marília Barreiros dos Santos, Mar Cendra, Pilar Ciriquián, Anna Crespo, Claudia di Guglielmo, Miriam Funes, Esther Gallardo, Marina Giannotti, Vanessa Gil, Laura Gómez, Verónica Hortigüela, Pilar Jiménez, Angels López, Reyes Malavé, Melba Navarro, Claudia Navarro, Sabine Oberhansl, Isabel Oliveira, Cristina Rivero, Ester Rodríguez, Marta Sanmartí, Maria Valls and Cristina Vergara from IBEC, as well as the many other wives, friends, sisters, girlfriends and mothers who took part!

IBEC has been building a strong programme of outreach activities during the past year, and in recent months the institute has welcomed its second visit from a Danish high school, as well as a group of mechanical and maritime engineering students from the Technical University of Delft in the Netherlands (below).

Our scientists also participated in summer's Festa de la Ciència in Barcelona's Parc de la Ciutadella (main pic), organised by the

Ajuntament de Barcelona, and IBEC also held an Open Day as part of the 17th Setmana de la Ciència in November (below centre).

This year, for the first time, we will take part in Fundació CatalunyaCaixa's Professors i Ciència programme, providing a visit and workshop for high school teachers. As in previous years the institute hosted students in IBEC labs during the summer as part of the same foundation's Joves i Ciència programme (below right).

Outreach activities have many benefits for those who take part, as well as for the public. As well as providing visibility for the institute, participating researchers get to practise presenting science to different audiences, skills which can look good on your CV.

If you'd like to interact with students or the public and can spare a few hours each year to take part in one or more outreach activities, please contact ibecevents@ibecbarcelona.eu.



Above: how Diario Medico covered the story; left, the new publication from NanoMed Spain

NanoMed Spain publication remembers late founder

October 23rd saw the launch in Madrid of a new NanoMed Spain document, 'Hoja por la Innovación en Nanomedicina en España', which diagnoses the country's R&D&I capacities in the field so far and presents the potential opportunities, challenges and recommendations for the future.

The event, which took place at the Ministerio de Economía y Competitividad, included a presentation by IBEC associate director Josep Samitier as coordinator of the NanoMed Spain platform, as well as a round table

involving IBEC director Josep A. Planell. Other participants at the event included representatives from the nationwide members of the platform from both research and industry.

'Hoja por la Innovación en Nanomedicina en España' is dedicated to one of the founders of NanoMed Spain, Joan Albert Vericat, whom Josep Samitier described as "a pioneer, part of that small group of people able to peer into the future and envisage the changes that will occur". Dr. Vericat died in July this year.

The 64-page document is available to view or download at the IBEC and NanoMed Spain websites. //

'Cross-fertilisation' day proves fruitful

At an international research institution such as IBEC, whose staff come from all over the world with different visa, tax, social security, contract and even language requirements, the Human Resources team can often find themselves faced with some real challenges.

That's why they decided to organise a 'cross-fertilisation of ideas' session with other HR teams at other research centres in the area, to share best practises, identify common problems and devise new tactics.

The second 'Trobada de RRHH dels centres CERCA' took place at IBEC on 12th July and welcomed around 20 HR reps from IBEC and other centres who are also members of the Centres de Recerca de Catalunya (CERCA), such as CRG, ICFO and VHIR.

"The objective was to find out how other centres approach different HR situ-

ations, and which policies and measures they have to solve them," explains Head of Human Resources at IBEC Carol Marí, who organised the day. "There are common issues that crop up over and over again in every research centre, such as predoctoral contracts, gender equality policies, language training, tax and social security situations, visa problems, and so on. The meeting was a good chance to share these issues and transfer ideas about how to tackle them."

A follow-up meeting will take place in 6-8 months at another institute in the region. "This type of meeting, where participants don't need to hide information from each other, is very rare in industry," comments Carol. "Research centres don't see other centres as competitors; rather, we try to help each other and learn from other initiatives and practices. It's also a great opportunity to do some networking." //



July saw the kick-off meeting of a new CIBER-BBN project coordinated by IBEC's Biomedical Signal Processing and Interpretation group.

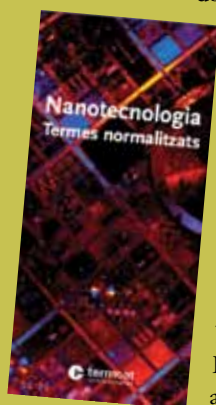
'Characterization and validation of novel ultrasensitive piezoresistive all-organic sensors for multimodal biomedical signals' (ULTRASEN-4BIO) aims to harness the power of some new ultrasensitive sensors developed by its ICMAB partner in intelligent and multimodal biomedical diagnostic devices. "Materials that can respond to external stimuli are essential in biomedical sensing, to allow us to acquire biomedical signals with high clinical impact," explains group leader Raimon Jané.

As well as evaluating and optimising the sensors – which are fully organic and can be placed in flexible thin films – ULTRASEN-4BIO will also propose clinical applications to test them in hospitals and cell culturing labs. "Their uses could include respiratory, cardiac, muscle activity and temperature monitoring, as well as cellular substrate stimulation," says Raimon. //



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// TERMCAT, the Centre for Terminology in Catalan, recently published a **guide to nanotechnology terms** to help standardise usage in the language. The words cover the various fields of nanotechnology and include general terms such as *tecnologies convergents* and more specific names for things such as *grafa*, and several researchers from Barcelona institutes helped to determine them. The guide (right), which could be useful to IBEC researchers who need



to present their science locally, can be downloaded from the TERMCAT website at www.termcat.cat.

// Associate Director Josep Samitier was one of the speakers at the **6th FP7 Conference on European Union R&D in Spain, 'Intervención ponentes Sesión Ciencia e Innovación H2020'**, which took place on 29th November in Zaragoza. The event, organised by the CDTI on behalf of the Spanish Ministry of Economy and Competitiveness, aimed to inform national institu-

tions about the EC's proposal for the next Framework Programme for Research and Innovation for 2014-2020, Horizon 2020.

// IBEC now has a dedicated **YouTube channel** at www.youtube.com/IBECTube, where viewers can watch a host of videos, ranging from scientific films made at the microscope to the video of the 2011 Christmas event, relating to the institute. Please help the page's popularity grow by subscribing to it and, most importantly, sending any videos you'd like to add to the channel to ibeccommunications@ibecbarcelona.eu. You can also add feedback in the 'Comments' sections.

IBEC PEOPLE

Dr. Marta Soler is the new Project Manager in the Corporate Projects Unit. As well as administrating NanoMed Spain's activities and other institutional alliances with hospitals and industry, she will contribute to the Unit's expertise in technology transfer to help IBEC's discoveries reach the market and patients. Before joining IBEC, Marta did her PhD at IBMB-CSIC and then worked at Prous Science and IMPPC.



More new starters (since 1 June): Tommy Tong, Margarita Alvira, Nanobioengineering; Anna Labernadie, Integrative Cell & Tissue Dynamics; Jordi Otero, Nanoscale Bioelectrical Characterization (postdocs). Marta Pozuelo, Nanoprobes & Nanoswitches; Marc Van Der Hofstadt, Nanoscale Bioelectrical Characterization; Olga Mur, Robotics; Claudia Navarro, Biomaterials for Regenerative Therapies; Pilar Rodríguez, Integrative Cell & Tissue Dynamics; Andrés Arcentales, Luís Estrada, Biomedical Signal Processing & Interpretation (PhD students). Juan Pablo Téllez, Biomedical Signal Processing & Interpretation; Marina Uroz, Integrative Cell & Tissue Dynamics; Agata Mata, Molecular & Cellular Neurobiotechnology; Roger Oria, Cellular & Respiratory Biomechanics; David Pardo, Bacterial Infections: Antimicrobial Therapies; Laia Gregori, Control of Stem Cell Potency; Xavier Marimon, Marina Victorio, Robotics (masters students). Natalia Ruiz, Molecular & Cellular Neurobiotechnology; Juan Manuel Jiménez, Artificial Olfaction (Lab Technicians).

More news on the web...

You can keep up-to-date with news and events at IBEC by visiting www.ibecbarcelona.eu



AWARDS AND HONOURS



Announce your defense: If you're a PhD student at IBEC and would like to invite the rest of the IBEC community to your thesis defense, please contact the Communications department. We can enter the details of the defense in the calendar on the IBEC website and also send an invitation to everyone at the institute.

For more details or to announce your thesis defense, please contact Vienna at vleigh@ibecbarcelona.eu.

Want to get involved?

If you have an idea for an article for *InsideIBEC* or would like to write one yourself, please contact us. Is your group starting or finishing a project? Is there an important change in procedure that people should know about, or a deadline coming up? Perhaps something interesting has happened in your area of research, or perhaps you've had an interesting visitor. Maybe you'd just like to find out what the IBEC community thinks about something, or you have a request for help.

Send your ideas to vleigh@ibecbarcelona.eu.

UPCOMING EVENTS

25th January

IBEC PhD Discussions Session:

Patricia Carulla (*Molecular & cellular neurobiotechnology*), Agustí Brugués (*Integrative Cell & Tissue Dynamics*)

7th February

IBEC Seminar: Self-powered capillary microfluidics and nanocontact printing *David Juncker, McGill University, Montreal, Canada*

15th February

IBEC Seminar: Crossroads in data analysis: a metabolomics perspective *Ivan Montoliu Roura, Nestlé Research Center, Lausanne*

18-19th February

IBMB-IBEC Joint Workshop:

Institut d'Estudis Catalans

22nd February

IBEC PhD Discussions

Complementary Skills Session:

Why biomedicine needs bioethics *Itziar De Lecuona, Observatori de Bioètica i Dret, Barcelona*

1st March

IBEC Seminar: Self-organization of bacterial populations *Jordi Garcia Ojalvo, UPF*

15th March

IBEC Seminar: Technology in Oral and Maxillofacial Surgery

Juan Antonio Hueto Madrid, Hospital General Universitari Vall d'Hebrón

For more events, please visit www.ibecbarcelona.eu.

Photo: Joan Massagué

IBEC in pictures

It's not surprising to find oneself face-to-face with eminent scientists on an average day at IBEC – but imagine Head of Infrastructures Isabel Oliveira's surprise when she rounded a corner in the Clúster building one day and bumped into none other than Barça manager Pep Guardiola. "I nearly fell over when I saw him!" she says. "He was very friendly, though, and more than happy to pose for this picture." What a gentleman!