



SCIENCE BRIDGES 1 - PROJECT OUTCOMES

Summary

Research bids applied for or in the pipeline: over £30m

Additional follow on projects: 23

Industry links made: over 17

Publications/citations: 43

PROJECT TEAM	PROJECT TITLE	PERSON	QUESTION	ANSWER
BIOENGINEERING/STEM CELL BID DEVELOPMENT AWARD SUMMARY				
Prof Shu Chien (UCSD) Prof Melanie Welham (Bath) Dr Tracy Melvin (Southampton)	Microarray platform to optimize the combinatorial microenvironments for controlling ESC growth and differentiation.	MW (Bath) TM (Soton) SC (UCSD)	Outcome	By bringing together UCSD's microarray technology and the UK institutions' fluorescently labeled embryonic stem cells, the team has developed a new platform. The work has led to improvements to the existing system, and the team is exploring applications for grant funding in the UK and US. They are also currently investigating whether new IP has been generated, which may have future commercial value.
			Research Grants	April 2008: Letter of intent for joint project between Shu Chien (UCSD), Tracy Melvin (Southampton) and Melanie Welham (Bath) submitted to Human Science Frontiers Programme. They had over six hundred applications and had short listed 60 - the chances of success were low. (Total budget ~\$350K) Not selected for full application. Joint grant application currently being prepared by Tracy Melvin

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				<p>(Southampton) and Melanie Welham (Bath), with Shu Chien (UCSD) as a named collaborator, for submission to BBSRC in October 2008 ‘ Systematic and dynamics analysis of the effects of combinatorial signals on the control of embryonic stem cell fate’. Approx. £500k</p> <p>UCSD side is also submitting new grant application to CIRM (California Institute for Regenerative Medicine, the organization which hands out the California state money for stem cells) for the development of new parameters for the cell array. New synthetic materials and cell culture surface properties will be tested with the goal to optimize the support of stem cell growth and differentiation. The new platform can provide further collaboration with Tracy Melvin (Southampton) and Melanie Welham (Bath) to test the dynamics of the hESC fates. \$300k</p>
			<p>Follow On Projects</p>	<p>Design of bespoke integrated optical/microfluidic device for stem cell applications (Tracy Melvin lead)</p> <p>Analysis of dynamic changes in gene expression in ES cells (Melanie Welham lead)</p> <p>These two projects are forming the basis of the grant application to BBSRC.</p> <p>Design cell array for the observation of hESC dynamic changes (e.g. morphology, intracellular forces, and structural modifications).</p>
<p>Dr Alan Dalton (Surrey) Prof Jim Earthman (UCI) Dr Richard Sear (Surrey) Professor Peter Donovan (UCI)</p>	<p>Stem cell proliferation and differentiation using novel nanostructure matrices.</p>	<p>JE (UCI) AD (Surrey)</p>	<p>Outcome</p>	<p>Using materials provided by Surrey, the UCI team was able to make and grow scaffolds successfully. The team is reviewing the protection of new IP, and is exploring bringing in one or more industry partners.</p>
			<p>Publications /Citations</p>	<p>An article about the project was printed in the August 2007 edition of the journal <i>Nature Nanotechnology</i>.</p> <p>Still in the throws of putting together a paper. Surrey’s student is still doing some analysis and one of the UCI students will be helping with a few</p>

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				<p>more experiments at UCI.</p> <p>The work has resulted in 2 publications and two pending. The published ones are:</p> <p>Ranking the affinity of aromatic residues for carbon nanotubes by using designed surfactant peptides. <i>Journal of Peptide Science</i> (2008), 14(2), 139-151.</p> <p>Effect of Electron-Donating and Electron-Withdrawing Groups on Peptide/Single-Walled Carbon Nanotube Interactions. <i>Journal of the American Chemical Society</i> (2007), 129(47), 14724-14732.</p> <p>Although these papers have been published within the last year they have already been cited over 10 times by peers</p>
			Patents	<p>The team are presently outlining a patent application on nanotube scaffolds. Patent application already submitted:</p> <p>Use of diameter-selective reversible cyclic peptides for purifying single walled carbon nanotubes. <i>U.S. Pat. Appl. Publ.</i> (2007), 13pp.</p>
			Research Grants	<p>The team applied for and received a £100k EPSRC Science Through People, Life & Materials grant.</p> <p>Applied for a NSF/EPSPRC International Team Award last fall but didn't have enough data then. £1.5m Hopefully, the next submission in a few months will get funded.</p> <p>Indirectly Dalton received 110K from SHARP Corporation</p> <p>They have a grant decision pending and are submitting 2 grants in October (Welcome trust £300K and NSF \$1m)</p>
			Follow On Projects	<p>Two projects will follow on. Dalton now has three new PhD students starting projects in this area who will collaborate directly with Irvine on scaffold development and on nanotube vehicles for RNase delivery into stem Cells.</p>

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Dr Lisa Flanagan (UCI) Prof Julian Chaudhuri (Bath) Dr Marianne Ellis (Bath)	Incorporation of PLGA hollow fibres into 3D matrices for treatment of spinal cord injury.	JC (Bath) LF (UCI)	Outcome	This project brought together mechanisms developed at UCI for spinal cord repair using stem cells with PLGA hollow fibres created by Bath. The award facilitated research on the new application of the fibres and a visit by Bath researchers to UCI. Enough proof of concept data has likely been generated at this point to apply for a grant.
			Research Grants	It is very likely that the UK team will apply to a UK research council for funding in the nerve repair/hollow fibre area. They will be including Lisa Flanagan as a collaborator with whom we would plan to do some joint work.
			Follow On Projects	The follow on project will be to develop smaller diameter fibres that are more in line with the size of the nerve cells. Work done as part of this grant has shown that a) the nerve stem cells will attach well to the fibres, and b) that we can make smaller fibres than those we had at the start of the project.
Prof Anthony Hollander (Bristol) Prof Robert Sah (UCSD) Prof Julian Chaudhuri (Bath) Dr Marianne Ellis (Bath) Dr Bo Su (Bristol) Dr Graeme Bydder (UCSD)	Scale-up of cartilage tissue engineering for the treatment of large chondral lesions in patients with degenerative osteoarthritis.	GB (UCSD) ME (Bath) JC (Bath)	Outcome	The joint team has established the feasibility of obtaining 3D shapes of animal knee joints using laser scanners and has concurrently been able to make spherical shell-shaped cartilaginous constructs.
			Publications /Citations	(Articles published) Bydder M, Rahal A, Fullerton GD, Bydder GM. The magic angle effect: a source of artifact, determinant of image contrast, and technique for imaging. J Magn Reson Imaging 2007;25(2):290-300. Du J, Bydder M, Takahashi AM, Chung CB. Two-dimensional ultrashort echo time imaging using a spiral trajectory. Magn Reson Imaging 2008;26(3):304-12. (Article in preparation) Bae WC, Du J, Sinha S, D'Lima D, Hermida J, Dwek J, et al. UTE MRI of deep layer of cadaveric patella at 3T: correspondence with calcified cartilage properties. Ann Biomed Eng 2007:(Submitted). (Abstracts published)

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				<p>Bae WC, Du J, Sinha S, D'Lima D, Hermida J, Dwek J, Bydder GM, Chung CB. UTE MRI of deep layer of cadaveric patella at 3T: correspondence with calcified cartilage properties. Ann Biomed Eng (Podium Presentation) 2007.</p> <p>Chung CB, Du J, Bae W, Statum S, Znamirovski R, Takahashi A. Ultrashort TE (UTE) Imaging of the Temporomandibular Joint (TMJ) at 3T. ISMRM 16th Annual Scientific Meeting & Exposition, Toronto, Canada (May 3-9, 2008), 738.</p> <p>Znamirovski R, Bydder M, Chung CB, Du J, Takahashi A, Bae W. Statum S, Bydder GM. Ultrashort TE (UTE) Imaging of the Extensor Tendon Functional Enteses of the Finger. ISMRM 16th Annual Scientific Meeting & Exposition, Toronto, Canada (May 3-9, 2008), 3641.</p>
			Research Grants	<p>Institution: NIH, NIAMS - approx \$840 4 years PI: Won C. Bae Title: Patterns and Pathways of Cartilage Degeneration in Osteoarthritis</p> <p>A number of ideas for potential collaborative proposals for osteochondral repair using co-culture systems.</p>
			Follow On Projects	<p>MRI of biochemical content of cartilage UTE MRI of human distal femur</p>
Dr Fatima Labeed (Surrey) Dr Lisa Flanagan (UCI) Dr Michael Hughes (Surrey) Prof Richard Oreffo (Southampton) Prof Peter Donovan (UCI) Professor Abe Lee (UCI)	Dielectrophoresis, a potential biomarker for stem cells.	FL (Surrey) RO (Soton) LF (UCI)	Outcome	<p>Researchers at Surrey carried out dielectrophoresis work on two stem cell lines. The same cell lines were then used in a flow device developed at UCI to make progress on their characterization. A Southampton Ph.D. student worked in the UCI lab for three weeks to assist in this effort. Significant results were achieved.</p>
			Publications /Citations	<p>Fatima H. Labeed, Jente Lu, Steve A. Marchenko, Michael P. Hughes, Edwin S. Monuki, Abraham P. Lee, Lisa A. Flanagan. A novel biomarker for human neural stem cell differentiation potential. <i>In preparation</i>, 2008.</p>

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				Dielectrophoresis: Application and potential for human skeletal cell characterisation and separation - Ayshe Ismail, Fatima Labeed, Mike Hughes, Lisa Flanagan, Abraham Lee, Richard OC Oreffo - University of Southampton Postgraduate conference June 2008 and manuscript in preparation 2008
			Research Grants	2008 UK-US Stem Cell Collaboration Development Award £5k UK Science & Innovation Network Foreign and Commonwealth Office “Stem Cell Analysis using Dielectrophoresis” Lisa A. Flanagan, Fatima H. Labeed Wellcome Trust/BBSRC (In preparation, 2008) approx. £1m Michael P. Hughes, Fatima H. Labeed, Richard Oreffo, Abe Lee, Edwin S. Monuki, Lisa A. Flanagan “Dielectrophoresis-a biomarker for stem cells”
			Follow On Projects	Additional projects will focus on analysis of human neural stem cells provided by the UCI group using dielectrophoresis (DEP) technology provided by the Surrey group.
Prof Paolo Madeddu (Bristol) Prof Mark Mercola (Burnham Institute/UCSD) Dr Constanza Emanuelli (Bristol) Prof Subramanian Shankar (UCSD)	Systems biology of endothelial cells and stem cells.	PM (Bristol) MM (UCSD) SS (UCSD)	Outcome	The joint team has conducted research on the identification, isolation, and expansion of vascular progenitor cells from human arteries and veins. The work involved the transfer of materials from the Burnham Institute to Bristol, two visits by Bristol researchers to San Diego, and the start of a three-month stay in San Diego of a Bristol Ph.D. student. They will continue their joint project and have plans for an additional Ph.D. student to work at UCSD.
			Publications /Citations	The collaboration was helpful in writing the following manuscript: Kita-Matsuo, H., Barcova, M., Prighozina, N., Salomonis, N., Wei, K., Jacot, J.G., Nelson, B., Spiering, S., Haverslag, R., Kim, C., Talantova, M., McCulloch, A.D., Conklin, B.R., Price, J.H., Chen, H.S.V., and Mercola, M. (2008). Stable Human Embryonic Stem Cell Lines for Tracking

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				and Purification of Cardiomyocytes by Genetic Selection. submitted.
			Follow On Projects	Engineering of human embryonic stem cell lines to visualize and purify endothelial precursors.
Prof Pandha Hardev (Surrey) Prof Dan Mercola (UCI) Dr Richard Morgan (Surrey)	Feasibility study for the prediction of outcome of prostate cancer.		Outcome	Project is awaiting ethics approval before moving forward.
Prof Andrew Putnam (UCI) Prof Richard Oreffo (Southampton) Dr Marianne Ellis (Bath) Prof Julian Chaudhuri (Bath)	A novel strategy to prevascularize engineered bone for reconstructive applications in regenerative medicine.	JC (Bath) RO (Soton)	Outcome	The bid development award has facilitated some exploratory research activities and a visit by both researchers to UCI.
			Patents	Bath holds a Patent on the hollow fibre technology
			Research Grants	Southampton and Bath are submitting a Grant to EPSRC in Autumn on 2008 - this may also include Dr Putnam approx £750k The UK team are in the process of applying to the EPSRC for funding to create vascularised bone tissue. This will involve seeding endothelial cells on the inside of the fibres. They will be including Andy Putnam as a collaborator with whom we would plan to do some joint work.
			Follow On Projects	Southampton and Bath are actively engaged in taking the monolith scaffold and vascularized concept forward to Research Council funding and this may also include Dr Andrew Putnam - Prof Chaudhuri and Dr Putnam currently in discussion in this area. Part of the Bath work has investigated mathematically modeling the fluid transport behaviour in the fibres. This will be important to support the future development of hollow fibre technology for vascularising tissue. The data that we have showing that endothelial cells attach to the inside surface of the hollow fibres would not have been achieved without the UK US project funding. This data will be used to support the grant proposal.

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Wireless Communications Bid Development Award Summary				
<p>Dr Eamonn O'Neill (Bath) Dr Per Johansson (UCSD) Dr Vassilis Kostakos (Bath)</p>	<p>Proximity-driven mobile malware.</p>	<p>PJ (UCSD) EO (Bath)</p>	<p>Outcome</p>	<p>This project created Bluetooth sensor networks on the UCSD and Bath campuses, and also developed a Facebook application to aid in data collection. Eriksson, which was already working with UCSD, has been involved in the project.</p>
			<p>Publications /Citations</p>	<p>C. Fleizach, M. Liljenstam, P. Johansson, G. M. Voelker, and A. Mehes, "Can you infect me now?: malware propagation in mobile phone networks", in WORM '07: Proceedings of the 2007 ACM workshop on Recurring malcode. New York, NY,USA: ACM, 2007, pp. 61-68.</p> <p>In progress one paper, where the bluetooth sensors developed together are used: G. Zyba, G. M. Voelker, M. Liljenstam, A. Mehes, P. Johansson, "Proximity-Vector Malware Propagation"</p> <p>CHI 2008: Kostakos, V., O'Neill, E. and Jones, S. (2008) Social networking 2.0, Ext. Abstr. CHI 2008 Conf. on Human Factors in Computing Systems, Florence, Italy, 3381-3386.</p> <p>An agreed outline of 2 conference papers and a journal paper on the mobile malware topic together with University of Bath, where we will combine or work on network spread works with vast data collected from the large Bluetooth scanner network.</p> <p>The Bluetooth sensor activity, sponsored by the SET2 funds, on UCSD campus we've called BlueMap and made public via a website and also an article published at Calit2. http://mesh.calit2.net/bluemap/ http://www.calit2.net/newsroom/release.php?id=1308</p> <p>The project also received coverage by the BBC.</p>
			<p>Research</p>	<p>Two proposals to EPSRC:</p>

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			<p>Grants</p> <p>One on ubiquitous computing got funded with Nottingham University. Eamonn as CI and Per as overseas collaborator £250K</p> <p>One the team didn't get short listed for they jointly submitted a proposal with Univ. Bath, Cambridge, UCL and Imperial College for an EPSRC grant on a collaborative project where Bluetooth traces would be used in studying spread of biological viruses as well as digital malware. This was for the WINS 3 call. Hopeful that this will resurrect the proposal against another call £1.9m</p>	
			<p>Follow On Projects</p> <p>They are actively pursuing the joint mobile malware project with UCSD, Ericsson and Univ. of Bath where the first part is the joint papers mentioned under 1.</p> <p>During the summer of 2008 a researcher from Univ. of Bath (James Mitchell) visited UCSD during 3 weeks in May-June and during July a UCSD PhD student (Gjergji Zyba) visited Ericsson in Stockholm and Univeristy of Bath. Both visits were a part of the joint research effort on mobile malware.</p>	
<p>Dr Curt Schurgers (UCSD) Prof Rahim Tafazolli (Surrey) Dr Alexander Gluhak (Surrey) Mr Mirko Presser (Surrey)</p>	<p>Scheduling and handoff for highly mobile networks</p>	<p>CS (UCSD) MP (Surrey)</p>	<p>Outcome</p>	<p>The bid development award enabled a site visit by Curt Schurgers to Surrey regarding details of the collaboration.</p>
			<p>Publications /Citations</p>	<p>The team currently have no joint publications, but are planning to do so in the near future.</p>
			<p>Research Grants</p>	<p>During our collaborations, the team have invited Curt to a European FP7 project proposal called EM&EM, and although the project made the threshold, there was not enough funding available for the project. There will be new opportunities for collaboration on FP7 proposals in call 4 (Spring 2009).</p> <p>In addition, the team already have some very interesting collaboration with a consortium of Australian universities under the leadership of Palaniswami and they are intending to get UCSD involved in this activity; planned activities include a workshop and student exchanges.</p>

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			Follow On Projects	(Also see Research Grants) The team are still working together under a common framework on several topics and we are planning a 6 month PhD student exchange visit in 2009 (either direction, it still needs to be decided) to work more closely together.
Prof Pamela Cosman (UCSD) Prof Nishan Canagarajah (Bristol) Prof Laurence Milstein (UCSD) Prof Ahmet Kondoz (Surrey)	Hierarchical modulation and scalable video for cognitive radio	NC (Bristol) PC (UCSD)	Outcome	A video codec has been developed and is being used in the project. Further, work done for this project by a UCSD student researcher has been submitted for publication.
			Publications /Citations	S.-H. Chang, P. Cosman, and L. Milstein, "Hierarchical Quadrature Amplitude Modulation for Multilevel Unequal Error Protection," to be submitted to the IEEE Transactions on Information Theory.
			Research Grants	US team are going to be targeting the Communications and Information Foundations Program at NSF, and the award we will ask for will be about \$300K total The UK researchers have a follow-on project funded by Toshiba to take this work further. The UK researchers will also submit an EPSRC grant application to develop this work.
Sustainable Environment Bid Development Award Summary				
Dr Yun Wang (UCI) Dr Frank Walsh (Southampton) Dr Matthew Watt-Smith (Southampton)	High-performance electrodes for PEM fuel cells - detailed characterization and determination of optimal properties.	FW (Soton) YW (UCI)	Outcome	This project leveraged the strengths of UCI's Renewable Energy Resources Lab with Southampton's Energy Technology Research Group to develop a 3D model for PEM fuel cells. The model is now complete.
			Publications /Citations	UCI ❖ Y. Wang, "Modeling of Two-Phase Transport in the Diffusion Media of Polymer Electrolyte Fuel Cells", J. Power Sources, in press. DOI: 10.1016/j.jpowsour.2008.07.007.

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				<ul style="list-style-type: none"> ❖ Y. Wang and X.H. Feng, “Analysis of Reaction Rates in the Cathode Electrode of Polymer Electrolyte Fuel Cells Part I: Single-Layer Electrodes”, J. Electrochem. Soc., Accepted. ❖ Y. Wang and X.H. Feng, “Analysis of Reaction Rates in the Cathode Electrode of Polymer Electrolyte Fuel Cells Part II: Dual-Layer Electrodes”, J. Electrochem. Soc., Submitted. ❖ Y. Wang and X.H. Feng, “Analysis of Reaction Rates in the Cathode Electrode of Polymer Electrolyte Fuel Cells Part III: Multiple-Layer Electrodes”, J. Electrochem. Soc., In preparation. <p>Southampton</p> <ol style="list-style-type: none"> 1. M.J. Watt-Smith, “<i>Characterisation of Porous Carbon Electrode Materials used in Proton Exchange Membrane Fuel Cells via Gas Adsorption</i>”, Journal of Power Sources, <u>184</u>, (2008), 28-37. 2. C. Ponce de León, F.C. Walsh, R.R. Bessette, C.J. Patrissi, M.G. Medeiros, D.J. Browning, J.B. Lakeman, R.W. Reeve, “<i>A Direct Borohydride-Peroxide Fuel Cell using a Pd/Ir - Coated Microfibrous Cathode</i>”, Electrochemistry Communications, (2008), accepted for publication. 3. A.A. Shah, F.C. Walsh, “<i>A Model for Hydrogen Sulfide Poisoning in Polymer Electrolyte Membrane Fuel Cells</i>”, Journal of Power Sources, (2008), submitted. 4. C. Ponce de León, F.C. Walsh, “<i>Sodium Borohydride Fuel Cells</i>”, Encyclopedia of Electrochemical Power Sources, Elsevier, (2008), submitted. 5. C. Ponce de León, F.C. Walsh, R.R. Bessette, C.J. Patrissi, M.G. Medeiros, A. Rose, D. Browning, J.B. Lakeman and R.W. Reeve, “<i>Recent Developments in Borohydride Fuel Cell Cells</i>”, Electrochemical Society Transactions, (2008), submitted.

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				<p>6. R.G.A. Wills, M.J. Watt-Smith, T.R. Ralph, F.C. Walsh, “<i>The Use of Fluorocarbon Surfactants for the Manufacture of Platinum-based PEM Fuel Cell Electrodes</i>”, Fuel Cells, (2008), in preparation.</p> <p>7. A.A. Shah, T.R. Ralph, F.C. Walsh, “<i>A Detailed Mathematical Model for the Degradation of Perfluorinated Ion-exchange Membranes in PEM Fuel Cells by Peroxide Attack. Part 1. Development of the Model</i>”, Journal of the Electrochemical Society, (2008), to be submitted.</p> <p>8. A.A. Shah, T.R. Ralph, F.C. Walsh, “<i>A Detailed Mathematical Model for the Degradation of Perfluorinated Ion-exchange Membranes in PEM Fuel Cells by Peroxide Attack. Part 2. Implementation of the Model</i>”, Journal of the Electrochemical Society, (2008), to be submitted.</p> <p>Southampton Presentations at Conferences and Symposia</p> <p>1. F.C. Walsh, Carlos Ponce de Len, “<i>Nanostructured and Microstructured Electrode Surfaces for Energy Conversion: Synthesis, Characterisation and Performance</i>”, Mexican Electrochemistry Conference, Enchenada, Mexico, 02-06 May (2008).</p> <p>2. F.C. Walsh, “<i>Redox Flow Batteries (RFBs): A Technology Perspective: Current Challenges & Future Developments</i>”, Invited lecture to the Workshop on Flow Cell Electrical Energy Storage, Capenhurst, United Kingdom, 12 June (2008).</p> <p>3. F.C. Walsh, “<i>Synthesis, Characterisation and Performance of Energy Conversion Electrode Materials having Nanostructured and Microstructured Surfaces</i>”, Plenary lecture at the 8th European Symposium on Electrochemical Engineering, CHISA 2008, Prague, 24-28 August, (2008).</p> <p>4. F.C. Walsh, “<i>Developments and Challenges in Redox Flow Batteries: The All- Vanadium, Cerium-Zinc and Soluble Lead-Acid Systems</i>”, 59th ISE Symposium, Seville, 7-10 September (2008).</p>

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				5. A.A. Shah, M.J. Watt-Smith, F.C Walsh, <i>“The Performance of Redox Flow Batteries: Modelling and Experimental Studies”</i> , Electrochem 08, Liverpool, 15-17 September, (2008).
			Patents	A patent is applied related to fuel cell flow field design. It’s not the direct outcome from this award. But the validated numerical tool from this project helps the development of the idea that has been patented.
			Research Grants	<p>UCI</p> <ol style="list-style-type: none"> 1. LANL-UC collaborative program (together with the LANL fuel cell team): ~\$710 K (Submitted) 2. DOE Basic Energy Sciences ~\$300K-500K (In preparation) 3. CALIFORNIA-CATALONIA engineering innovation program: Development and Optimization of a Direct Glucose Fuel Cell for Implantable Devices ~\$30,000 (Submitted) 4. Faculty Career Development Program: Startup Analysis for PEM Fuel Cells (Awarded) <p>Southampton</p> <ol style="list-style-type: none"> 1. FP7 European Union proposal (F.C. Walsh) on “Scale-up and modelling of fuel cells and flow batteries”. (200k Euros) 2. EPSRC starter grant (A.A. Shah) on “Mathematical modelling of high surface area electrodes used in flow batteries”. (£100k) 3. Dstl work in progress (C. Ponce de León) on “Electrode materials for the direct borohydride fuel cell”. (£20k)
			Follow On Projects	The most significant outcomes from this project are the validated numerical tools and developed theories regarding electrode performance. They will follow on these outcomes and seek for industrial collaboration to utilize the numerical tools, explore patentable ideas, and apply for funds. The US team are in process of contacting Hyundai for potential collaboration. Nissan also shows interests in our research. In addition, due to the outstanding work on theories development, LANL (Las Alamos National Lab) is looking for collaboration with us. They recently submitted a joint proposal for probing solid water formation within fuel

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				<p>cells. In addition, they are also looking for opportunities to further our collaboration with the UK researchers.</p> <p>The most significant outcomes from this project are experimental techniques developed for characterization of electrode surface area in PEM fuel cells and mathematical modelling approaches to aspects of PEM fuel cell (and related flow battery) performance.</p> <p>These experimental techniques and mathematical modeling tools will be utilized, with industrial collaboration, to prepare research proposals. The UK team are in collaborating with Dstl on direct borohydride fuel cells and ACAL energy on hydrogen-air fuel cells together with mathematical modeling of PEM electrocatalysts and membranes (Johnson Matthey). Discussions with C-Tec Innovations are taking place on the modelling of flow batteries and fuel cells.</p> <p>One of the project team (Matt J. Watt-Smith) has obtained a position in a UK government-based research laboratory specializing in energy conversion and batteries; he continues to work with the Southampton team as a Visiting Research Fellow. Dr Carlos Ponce de León has been promoted to Lecturer status and Dr Akeel A. Shah has been appointed to a Lectureship in Energy Conversion and has just been appointed as the Director for the MSc course in Sustainable Energy Technologies.</p> <p>A discussion meeting on joint R & D proposals with our US colleagues is being planned.</p>
Prof Nick Lieven (Bristol) Dr Mike Todd (UCSD) Prof Chuck Farrar (Los Alamos National Laboratory) Prof Colin Taylor (Bristol) Prof Mike McDonald (Southampton)	Global monitoring and sensing: integration of data, communication, and modelling.	NL (Bristol) MT (UCSD)	Outcome	Completion expected Oct 2008
			Publications / Citations	Submission of a paper to the International Modal Analysis Conference (Feb 09), and the outline for a review paper for the Journal of Structural Health Monitoring;
			Patents	No patents so far, but the area of energy harvesting is entirely open, so the work in non-linear applications of the technology will inevitably lead

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				to a application in the area;
			Research Grants	The team are planning three joint proposals: National Institute of Standards and Technology approx \$9m Homeland Security Office (DHS) approx \$3m EPSRC/AgustaWestland proposal on intelligent power harvesting for rotorcraft approx £100k
			Licenses	No license deals as yet but significant potential
			Follow On Projects	The team are also planning follow on visits beyond this initial project to continue the work (in October and January). An unanticipated outcome of the work has been the other collaborations that have emerged through the visits. Mike Todd will be developing work with Dr Steve Burrow at Bristol on non-linear energy harvesting techniques (linking both of their research areas) and Mike will be linking with Los Alamos and UCSD on homeland security research. Neither of these outcomes were planned, so they are pleased about this!
Prof Stan Kolaczowski (Bath) Adjunct Associate Prof Vincent McDonell (UCI) Prof Bob Cattolica (UCSD) Associate Prof Richard Herz (UCSD) Prof Gary Hawley (Bath) Prof Matt Davidson (Bath) Prof Rod Scott (Bath)	Integrated reaction systems for gas to liquid biofuels and electrical power.	SK (Bath) BC (UCSD)	Outcome	Completion expected Dec 2008
			Patents	Significant opportunity within Stan Kolaczowski's projects for development of patents with the number of industrial partners involved within the two projects.
			Research Grants	A research proposal was prepared by UCI/UCSD, for a DOE call covering: detailed CFD/chemical kinetics on the dual-bed gasifier.
			Licenses	No license deals as yet but significant potential
			Follow On Projects	Stan Kolaczowski had an undergraduate project at UCSD and is currently scoping potential undergraduate projects for next year.
Prof Stan Kolaczowski	Multi-functional compact		Outcome	Completion expect Sept 2008

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(Bath) Associate Prof Richard Herz (UCSD) Prof Paul Sermon (Surrey) Prof Bob Cattolica (UCSD) Prof Gary Hawley (Bath) Prof Matt Davidson (Bath) Prof Rod Scott (Bath)	reactors for bio-diesel production.	SK (Bath) RH (UCSD) BC (UCSD)	Patents	Significant opportunity within Stan Kolaczowski's projects for development of patents with the number of industrial partners involved within the two projects.
			Research Grants	Two research proposals prepared by the Stan Kolaczowski team, one for a TSB call on Biomass gasification approx £500k , the other for the Carbon Trust. Newton Fellowship (potentially to be made depending on outcome of discussions) - approx £125k A research proposal was prepared by UCI/UCSD, for a DOE call covering: detailed CFD/chemical kinetics on the dual-bed gasifier. NSF and DOE would be where we will try re grant proposals - approx £500k
			Licenses	No license deals as yet but significant potential
			Follow On Projects	Stan Kolaczowski had an undergraduate project at UCSD and is currently scoping potential undergraduate projects for next year.
Dr Marialenna Nikolopoulou (Bath) Prof Paul Linden (UCSD) Prof Jan Kleissl (UCSD)	Personal perception of air pollution in the urban environment.	MN (Bath)	Outcome	Completion expect Sept 2008
			Research Grants	Paul Linden named as a collaborator within Marialena's Nikolopoulou's EPSRC Challenging Engineering Award approx £1 million . Marialena named as an external collaborator on large bid for the creation of a new centre at UCSD approx \$5m per year for 5 years .
Prof Nick Lieven (Bristol) Assistant Prof Jan Kleissl (UCSD) Prof Colin Taylor (Bristol)	Optimizing sustainable resource use in mini-grids using wireless sensor networks and decision algorithms.	NL (Bristol) JK (UCSD)	Outcome	Completion expect Sept 2008
			Research Grants	Mini-grids project: A proposal will be submitted to the California Energy Commission building technologies program (deadline August 15) - approx \$500k .

PROJECT TEAM	PROJECT TITLE	PERSON	QUESTION	ANSWER
Prof Mutasem El-Fadel (Southampton) Associate Prof Brett Sanders (UCI) Prof Paul Bates (Bristol)	Development of an expert decision-support system for flood delineation and risk management.		Outcome	No significant outcomes to date. Completion expect Sept 2008
Prof Charles Banks (Southampton) Associate Prof Jean-Daniel Saphores (UCI) Research Fellow Marcell McManus (Bath) Prof Trevor Tanton (Southampton) Prof James Famiglietti (UCI) Associate Prof Diane Pataki (UCI)	Water availability and the production of biofuels - an integrated assessment.	CB (Soton)	Outcome	Completion expect Dec 2008
			Research Grants	Newton Fellowship (potentially to be made depending on outcome of discussions in September) - £125k
Travel Award Summaries				
Reader Cathryn Mitchell (Bath)	Visit with Professor Andrew McCulloch to discuss the use of advanced medical imaging techniques to diagnose heart problems.	CM (Bath)	Outcome	The travel award enabled visits to San Diego by Cathryn Mitchell and later one of her students, which resulted in contributions to a grant proposal by Cathryn Mitchell to EPSRC. UCSD's contribution was to provide computer modeling and data not available in the UK. The team is hoping for applicable technology within 3 years and is currently writing a new grant for an NHLBI RFA.
			Research Grants	A £1m EPSRC Young Research Award was granted.

PROJECT TEAM	PROJECT TITLE	PERSON	QUESTION	ANSWER
Prof Nigel Smart (Bristol)	Award supported the visit of Professors Mihir Bellare (UCSD) and Gene Tsudik (UCI) to Bristol to discuss collaborative work in cryptography.	NS (Bristol)	Outcome	The visit established stronger links with UCI and UCSD. A UCSD student later presented a seminar at Bristol following the initial meetings.
Prof Anthony Darby (Bath)	Professors Darby and Tim Ibell (Bath) visited the blast simulator at UCSD's Jacob School of Engineering (JSOE) and met with the JSOE Dean, Freidre Seible, and Professor Gilbert Hegemier.	AD (Bath)	Outcome	The Bath team visited UCSD to learn more about setting up a new blast simulator in the UK and to develop an expert system for strengthening structures using fibre reinforced polymers. The link with UCSD will provide access to US markets and specialist knowledge in earthquake strengthening. The team also expects a £150k VC investment from IPL leading to a spin-out or technology to license.
Dr David Gibson (Bristol)	Meeting of Dr. Gibson and Dr. Neill Campbell (Bristol) with Dr. Serge Belongie (UCSD) to discuss collaboration in computer vision research.	DG (Bristol)	Outcome	The visit established new links between Bristol and UCSD in this area.

PROJECT TEAM	PROJECT TITLE	PERSON	QUESTION	ANSWER
Dr Lorraine Warren (Southampton)	Dr. Warren visited UCSD to meet with Dr. Ray Smilor and Global CONNECT to discuss research methodology for exploring the role of social capital in high technology cluster development.	LW (Soton)	Outcome	The visit established stronger links between the researchers at UCSD and Southampton.
Prof Dhiraj Pradhan (Bristol)	Meeting of Professor Pradhan with Professor Jean-Luc Gaudiot (UCI) and other faculty members in the nanotechnology group at UC Irvine.	DP (Bristol)	Outcome	The visit established stronger links between the researchers at UCI and Bristol.
Dr David Carey (Surrey)	Meeting between Dr. Carey, Dr. Ilya Krivorotov (UCI), and Dr. Jeremy Sloan (Surrey) at UCI to discuss research in carbon nanotube spintronics for high-frequency applications.	DC (Surrey)	Outcome	Based on the outcome of the meeting, the collaborators are considering submitting a proposal to a funding agency to support a joint research project.
			Research Grants	In progress. Funding these small scale initiatives is crucial before larger scale activities can take place.
			Follow On Projects	Subsequent to the travel grant we have met in Seattle and recently (July 08) in Japan to continue collaborations. We have identified the problem areas in the samples and a clearer route to characterisation.
Dr Dimitri Papamoschou (UCI)	Visit by Dr Papamoschou to Southampton to meet with Prof Jeremy Astley, Prof Philip Nelson, and Dr Rod Self to discuss	DP (UCI)	Outcome	The visit established stronger links between the researchers at UCI and Southampton.
			Follow On Projects	A partnership that includes UCI, Rolls Royce, and U.S. aerospace companies will engage in technology development for a jet noise suppression method developed at UCI. Although not a direct outcome of

PROJECT TEAM	PROJECT TITLE	PERSON	QUESTION	ANSWER
	collaborative research efforts to reduce aircraft noise.			the SET-Squared travel grant, the interactions with Rolls-Royce personnel and affiliated labs at the University of Southampton were useful in exposing the researchers to this technology and may have played a role in the establishment of the partnership.