Capital for Great Technologies Call: Advanced Materials Panel

Panel Date: 24-25 June 2013	
Panel Members:	
Steeper, Mr. Michael (Panel Chair)	Siemens plc
Coates, Professor Phil	University of Bradford
Dalgarno, Professor Kenneth	Newcastle University
Hardeman, Professor Robert	Seagate Technology (Ireland)
Humphreys, Professor Sir Colin	University of Cambridge
Porch, Professor Adrian	University of Cardiff
Withers, Professor Philip	The University of Manchester
Spearing, Professor Mark	University of Southampton
Crook, Dr. Simon (Panel Convenor)	EPSRC

Rank	Title	Equipment Account Reference	Principal Investigator	Equipment Account Holder	Lead Research Organisation	Partner Research Organisation	Awarded
1	Characterisation and Manipulation of Advanced Functional materials and their Interfaces at the Nanoscale	EP/L017008/1	Samuel, Professor I.D.W.	Hawkesworth, Professor C	University of St Andrews	N/A	£3,707,317.00
2	Composites Innovation: from Atoms to Applications	EP/K035746/1	Wisnom, Professor Michael	Orpen, Professor A	University of Bristol	N/A	£3,098,400.00
3	Scale-up Facilities for Resource Efficient Processing of High Performance Alloys	EP/L017466/1	Zhongyun, Professor Fan	Fan, Professor Z	Brunel University	N/A	£3,855,000.00

Rank	Title	Equipment Account Reference	Principal Investigator	Equipment Account Holder	Lead Research Organisation	Partner Research Organisation	Awarded
4	On the Nano-engineering of Surfaces In Demanding Environments (ON-SIDE)	EP/J021229/1	Sherry, Professor Andrew	Bailey, Professor CG	University of Manchester	N/A	£4,252,494.00
5	Capability to Improve the Energy Efficiency of Electronic & Optoelectronic Devices	EP/J014478/1	Paul, Professor Douglas J.	Chapman, Professor J	University of Glasgow	N/A	£3,040,349.00
6	Ion-Beam-Analysis User's Service for Interface Characterisation and Engineering - NEIBUS	EP/K022679/1	Cumpson, Professor Peter	Roskilly, Professor AP	Newcastle University	N/A	£2,723,953.00
7	Multifunctional high performance alloys for extreme environments	EP/J013501/1	Reed, Professor Roger	Walmsley, Professor IA	Oxford University	N/A	£3,524,000.00
8	Multifunctional Additive Manufacturing	EP/K005138/1	Hague, Professor Richard	Tendler, Professor S	University of Nottingham	N/A	£2,717,669.00
9	EPSRC Proposal for the Development and Manufacture of Advanced Composite Materials	EP/K00509X/1	Hayden, Professor Brian E.	Nelson, Professor P	University of Southampton	N/A	£3,317,403.00
Decision pending for four applications							
Twenty-one applications were unsuccessful							
Total value applied for:							£114,644,492.60
Total value funded							£30,236,585.00
Success Rates (No. of grants)							26.5%
Success Rates (% of grant value)							26.4%

Capital for Great Technologies Call: Advanced Materials Panel

University of St Andrews, Professor Ifor Samuel					
EPSRC Equipment Account Reference:	EP/L017008/1				
Title:	Characterisation and Manipulation of Advanced Functional Materials and their Interfaces at the Nanoscale				
Principal Investigator:	Professor I.D.W Samuel				
Lead Research Organisation:	University of St Andrews				
Partner Research Organisations	None				
Departments:	Physics and Chemistry				
Researcher Co-investigators:	Professor J Irvine		Professor W Zhou		
	Dr W Curtin				
Project Partners:	None				
Call:	Capital for Great Technologies - Advanced Materials				
Starts:	01 October 2013	Ends:	30 September 2023	Value:	£3,707,317.00
EPSRC Research Area Classifications	Photonic Materials and Metamaterials		Graphene and Carbon Nanotechnology		
EPSRC Industrial Sector Classifications:	Electronics				
Related Grants:	None				

Grant Summary

The purpose of this proposal is to bring together a new facility to provide state of the art capability to analyse and control functional materials at the nanoscale to underpin and drive forward critical materials research in energy materials, photonics, metamaterials and electronics. It is intended to use this facility to support approximately 180 materials researchers at the University of St Andrews and extend this capability to users outside St Andrews in both academia and industry. It builds on the outstanding record of St Andrews in high quality research and investment in advanced materials research by the University, SFC, EPSRC, and industry as well as our experience of sharing our facilities with external users.

Organisation Website:	www.st-andrews.ac.uk

University of Bristol, Professor Michael Wisnom					
EPSRC Equipment Account Reference:	EP/K035746/1				
Title:	Composites Innovation: From Atoms to Applications				
Principal Investigator:	Prof. M. R. Wisnom				
Lead Research Organisation:	University of Bristol				
Partner Research Organisations	None				
Department:	Aerospace Engineering, Physics, Chemistry				
Researcher Co-investigators:	None				
Other Investigators:	Prof. K. D. Potter		Prof. M. Kuball		
	Prof. S. R. Hallett		Dr. S. A. Davis		
Project Partners:	National Composites Centre				
Call:	Capital for Great Technologies - Advanced Materials				
Starts:	01/10/2013	Ends:	31/03/2015	Value:	£3,098,400.00
EPSRC Research Area Classifications:	Materials Engineering - Composites				
EPSRC Industrial Sector Classifications:	Aerospace, Defence and Marine		Transport Systems and Vehicles		
Related Grants:	None				

Grant Summary

A unique and internationally leading facility will be created to generate a step-change in understanding of the evolving microstructure of advanced composite materials based on measurements in unprecedented detail throughout the manufacturing and product cycles. This will provide the scientific basis that will enable the creation of next generation multi-functional materials.

Composite materials and structures were identified as a key multi-sectoral technology for the future in the 2009 National Composites Strategy and are of strategic importance for UK industry from aerospace to microelectronics industries. **This new facility will enable fundamental new materials science research in Physics and Chemistry, through to research on processes and mechanisms in Engineering, building on the world leading activities of the University of Bristol's Advanced Composites Centre for Innovation and Science (ACCIS)**.

The facility will comprise of a suite of three interlinked and complementary sets of heavily instrumented equipment for characterisation of the processes, the mechanical performance, and the micro and nanostructure of composite materials under realistic conditions.

Innovation Through Knowledge Based Processing: The three key pieces of equipment within this suite are a Process vessel, a bespoke X-ray CT system targeted at capturing data as quickly as possible to enable the study of developing microstructures and development of an Automated Fibre Placement simulation rig.

Innovation Through High Speed Deformation Tracking: This suite of equipment focusses on capturing displacement and strain data principally during mechanical and structural evaluation testing, although the provision of twin viewing ports in the process vessel also enables its use in tracking the development of geometry during cure at a larger scale than the laser line scanner.
Innovation Through Nano- To Microstructural Characterisation: Characterisation equipment (SAXS, CL-SEM, high speed AFM) provides critical new capability to support projects which build on the core strengths of Engineering, Physics and Chemistry, and will underpin existing and planned collaborations pioneering next generation Advanced Functional Composite Materials.
The process equipment will be located in dedicated laboratory space within the second phase expansion of the National Composites Centre (NCC), maximising the impact of the science deriving from its use in an industrial context. The mechanical performance and microstructural equipment will be located at the University to draw in expertise from across Science and Engineering, and take advantage of the in-depth internationally leading strength in materials characterization and innovation. The facility will build on the research carried out by ACCIS, which has major industrial backing and works closely with the NCC, part of the High Value Manufacturing Catapult.

Organisation Website:	www.bristol.ac.uk/composites

Brunel University, Professor Zhongyun Fan					
EPSRC Equipment Account Reference:	EP/L017466/1				
Title:	Scale-up Facilities for Resource Efficient Processing of High Performance Alloys				
Principal Investigator:	Professor Z. Fan				
Lead Research Organisation:	Brunel University				
Partner Research Organisations	N/A				
Department:	BCAST				
Researcher Co-investigators:	Dr Roger Darlington (JLR)		Dr Martin Jarrett (Constellium)		
Project Partners:	JLR		Sarginsons		
	Constellium		JVMHenrobe		
	Norton Aluminium		Meridian		
	Innoval Technology				
Scheme:	Capital for Great Technologies - Advanced Materials				
Starts:	01/08/2013	Ends:	31/01/2014	Value:	£3,855,000.00
EPSRC Research Area Classifications:	Materials Engineering - Metals & Alloys				
EPSRC Industrial Sector Classifications:					
Related Grants:	EP/H026177/1; EP/H014225/1; EP/I038616/1				

Grant Summary

Over the last few years EPSRC has invested significantly in metal casting research at Brunel's research institute BCAST, notably in the EPSRC Centre - LiME (£6M) in 2010, the TARF-LCV programme (£4.2M) in 2011 and other responsive mode projects (£1M). Both the LiME and TARF-LCV programmes were founded on our long-term vision for full metal circulation: that the global demand for metallic materials should be met by a full circulation of secondary metals with only limited addition of primary metals each year, which can be achieved by effective reuse, remanufacture, closed-loop recycling and effective recovery of secondary metals. This full metal circulation represents a paradigm shift for metallurgical science, manufacturing technology and the industrial landscape. LiME was founded to provide a solid foundation for full metal circulation. Although substantial progress [3] has been made in the fundamental understanding of heterogeneous nucleation, developing new metallic materials and advancing casting technologies under both LiME and TARF-LCV the industrial adoption and exploitation of the research output has been constrained, mainly due to the lack of scale-up facilities to take the lab-proven concepts and processing technologies to a suitable level, at which industrial companies are willing to take the risk to conduct industrial trials.

We propose to establish a unique national scale-up facility for light metal casting research to be hosted in the Advanced Metal Casting Centre (AMCC) at Brunel University. AMCC aims to bridge the gap between fundamental research and industrial applications. Together with the EPSRC Centre for Innovative Manufacturing in Liquid Metal Engineering (LiME for short), the AMCC will provide high performance light alloys, resource efficient casting technologies and component innovations to meet the long- and mid-term needs of the automotive industry. To set up the AMCC we are requesting £3.9M from EPSRC to match a £2.5M investment by Brunel University for capital equipment and infrastructure and £3.15M cash and £3.36M in-kind contributions from our industrial partners for the initial research projects. The scale-up facilities will be installed in a purpose-built 1500m^2 laboratory complete with power, water and gas supply. The new facilities will enable and enhance our established research capability in many different areas, such as liquid metal engineering, alloy development, processing technologies and component innovation. We will work closely with the automotive industry and its supply chain.

Organisation Website:	www.brunel.ac.uk/bcast

The University of Manchester, Professor Andrew Sherry					
EPSRC Equipment Account Reference:	EP/J021229/1				
Title:	On the Nano-engineering of Surfaces In Demanding Environments (ON-SIDE)				
Principal Investigator:	Professor Andrew Sherry				
Lead Research Organisation:	The University of Manchester				
Partner Research Organisations	None				
Department:	School of Materials				
Researcher Co-investigators:	None				
Other Investigators:	Professor Phil Withers		Professor Brian Derby		
	Professor Michael Preuss		Professor Simon Pimblott		
Project Partners:	Dalton Nuclear Institute		BP International Centre for Advanced Materials (BP ICAM)		
Call:	Capital for Great Technologies - Advanced Materials				
Starts:	17 July 2013	Ends:	31 March 2015	Value:	£4,252,494.00
EPSRC Research Area Classifications:	Performance and Inspection of Mechanical Structures and Systems			Materials For Energy Applications	
EPSRC Industrial Sector Classifications:	Energy and Aerospace				
Related Grants:	EP/J021172/1 - New Nuclear Manufacturing (NNUMAN)				

Grant Summary

The intelligent design and introduction of advanced materials into engineering practice requires new understanding regarding the optimisation of manufactured surfaces that is tuned to the specific material and environment of interest to enhance the quality and reliability of components. Today, operational environments are increasingly harsh in terms of pressure, temperature, stress and environment, including radiation fields, and there is a need to develop new facilities that not only characterise key features of surfaces, but do so within the operational environments of interest. Whilst ex situ examination is advancing our understanding of materials performance, the opportunity now exists to introduce a step change by building an in operando examination capability to interrogate materials within the operating environments experienced across the Nuclear, Oil & Gas and Aerospace sectors. ON-SIDE will establish a new capability for characterising the gradients in composition, structure, and properties of advanced material surfaces within the demanding operational environments experienced in service. This will provide a complete capability to map composition, structure and properties over the critical 200µm below the surface, or beneath coatings, down to the nanoscale for advanced materials under stress, at high temperatures, within radiation fields, and in

corrosive media.
ON-SIDE will thus establish a new leading edge capability for characterising the surface integrity of advanced materials at the nanoscale within the harsh operational environments experienced in service. The capital investment will bring together state-of-the-art equipment for characterising surfaces at the nanoscale with the ability to do so under the relevant in-service conditions of high temperature, stress, and harsh environments enabling the study of: performance under irradiation, corrosion and oxidation, and depth-resolved structure, properties and damage near surface.

Organisation Website:	www.manchester.ac.uk

University of Glasgow, Professor Douglas Paul					
EPSRC Equipment Account Reference:	EP/J014478/1				
Title:	Capability to Improve the Energy Efficiency of Electronic & Optoelectronic Devices				
Principal Investigator:	Prof Douglas J. Paul				
Lead Research Organisation:	University of Glasgow				
Partner Research Organisations	None				
Department:	School of Engineering				
Researcher Co-investigators:	None				
Other Investigators:	Prof JMR Weaver		Dr D MacIntyre		
	Prof I Thayne		Dr H Zhou		
	Prof DRS Cumming		Dr S Thoms		
Project Partners:	Oxford Instruments Plasma Technology		DSTL		
	NPL		NMI		
	Gas Sensing Solutions Ltd.		Kelvin Nanotechnology Ltd.		
Call:	Capital for Great Technologies - Advanced Materials				
Starts:	01 September 2013	Ends:	31 August 2015	Value:	£3,040,349.00
EPSRC Research Area Classifications:	Non CMOS Device Technology	RF & Microwave Devices	Optoelectronic devices and circuits, RF & Microwave Devices	CMOS Device Technology	
EPSRC Industrial Sector Classifications:	Electronics		Energy		
Related Grants:	None				
Project URL	http://www.jwnc.gla.ac.uk/Capital.html				

Grant Summary

The James Watt Nanofabrication Centre at the University of Glasgow has been awarded £3M of equipment under the EPSRC Capital for Great Technologies awards to improve the energy efficiency performance of electronic and optoelectronic devices for a large range of applications. Electronic and optoelectronics are ubiquitous in everyday life. We rely on Information, Communication Technology (ICT) systems such as computers, smart phones and the internet for the majority of our society needs. Food production, transportation and clothing manufacture now all rely on computers and the internet. Many cars have over 100 microprocessors to control not just the engine but climate control, seats, mirrors and entertainment systems along with keeping the driver and occupants safe at all

times. All these systems are powered by electronic and optoelectronic devices.

As the number of electronic and optoelectronic devices inside ICT systems increases, so does their consumption of electricity. According to "SMART 2020: enabling the low carbon economy in the information age'' study, ''the share of ICT on the world wide energy consumption today is in the range of 2-5%. Given that the use of ICT will further increase and the overall energy consumption will hopefully decrease due to the help of ICT and other measures, it is expected that the share of ICT on the world wide energy consumption will grow in the future. Carbon dioxide emissions from the use of ICT is therefore presently increasing. Hence, it becomes more and more important to consider and improve the energy efficiency of ICT.''
The performance of these modern electronic and optoelectronic devices is dominated by their surfaces. Atomic bonds which should have been connected to nearest neighbour atoms ''dangle'' at the surfaces and form a plentiful source of unwanted electronic charge. The ''dangling bonds'' increase the energy consumption of electronic and optoelectronic devices through a range of unwanted parasitic mechanisms. The solution to this problem is to passivate the surface by coating it with a material which electrically ''heals'' the surface, giving it electrical properties more similar to the bulk semiconductor.
The funding will allow the purchase of new equipment, including tools to etch semiconductor materials and then immediately deposit electrically passivating layers to enable the fabricate of high performance electronic and optical devices such as transistors, LEDs and lasers. In addition an analysis chamber will allow the detailed chemical analysis of the patterned surfaces to allow the processes to be optimised allowing the highest level of performance for devices. The equipment will support a range of new research projects, including:
- The development of more efficient GaN power electronics, which could improve the lifespan of batteries in many consumer electronic devices as well as reduce their carbon footprint.
- Improving the efficiency and durability of solar collection technology, creating a dramatic reduction in the cost of large-scale exploitation of solar energy.
- The development of a 'superspectral' imaging camera which will integrate visible, infrared and mid-infrared imaging sensors on a single chip for the first time, with applications for security and medical sensing technology.
- An industrial project with Scottish SME Gas Sensing Solutions to further improve the energy efficiency of infrared gas detectors, which measure the amount of carbon dioxide in the atmosphere. These detectors are used to monitor the environment in industry, buildings and homes to help reduce energy consumption and carbon dioxide emissions.
The tools will be housed and operated in the James Watt Nanofabrication Centre in the University of Glasgow and access to the tools will be provided through the EPSRC III-V National Facility, the STFC Kelvin-Rutherford facility and commercially access to industry will be provided through Kelvin Nanotechnology Ltd.. As the James Watt Nanofabrication Centre at Glasgow is presently micro- and nanofabricating electronic and optoelectronic devices for 28 UK universities and 58 UK companies, the equipment will also help underpin a large range of research and development work being undertaken by UK academia and industry.

Organisation Website:	http://www.jwnc.gla.ac.uk/index.html

Newcastle University, Professor Peter Cumpson					
EPSRC Equipment Account Reference:	EP/K022679/1				
Title:	Newcastle-EPSRC Ion-Beam-Analysis User's Service for Interface				
Principal Investigator:	Professor Peter J. Cumpson				
Lead Research Organisation:	Newcastle University				
Partner Research Organisations	None				
Department:	Mechanical, Electrical, Chemical Engineering and Medical Schools				
Researcher Co-investigators:	Dr Ian Fletcher, Prof Ian Metcalfe				
Other Investigators:	Dr Ian Fletcher		Prof Ian Metcalfe		
	Prof Anthony O'Neill		Dr Neil Keegan		
	Dr John Hedley				
Project Partners:	BAe Systems		Shell		
	Akzo Nobel		CPI		
Call:	Capital for Great Technologies - Advanced Materials				
Starts:	01 July 2013	Ends:	30 September 2014	Value:	£2,723,953.00
EPSRC Research Area Classifications:	Optoelectronic Devices and Circuits		Manufacturing Technologies		
EPSRC Industrial Sector Classifications:	Healthcare		Chemicals		
	Electronics		Energy		
Related Grants:	EPSRC Mid Range Facility for XPS (2011-2016)				
Project URL	www.ncl.ac.uk/nexus				

Grant Summary

Engineered surfaces and interfaces are key to developing materials with new properties for **energy storage and conversion**, **catalysis**, **medical diagnostics, medical implant technology , organic electronics** and numerous other applications. This is a *critically exciting era in the evolution of methods of control of surfaces and interfaces*. To have international impact across the wide field of Interface Engineering the UK **must have the capability to fabricate, probe and characterise at nanoscale resolution and with greater molecular information.**

We will enhance Newcastle's core strengths in interface engineering by putting in place world-class fabrication facilities and interface characterisation equipment, while providing this to collaborators from across the UK **to improve wider UK capability**. We will establish a **Newcastle-EPSRC Ion-Beam-Analysis User's Service for Interface Characterisation and Engineering (NEIBUS)**, comprising state-of-the-art Secondary Ion Mass Spectrometry (SIMS), Helium Ion Microscope (HIM) instruments and top quality support in sample preparation (Atomic Layer Deposition, ALD) , spectrum acquisition and interpretation of the results. This will be facilitated by an online remote-access and collaborative e-science system. **This builds on EPSRC's 2011 £3.1m strategic "Mid-Range-Facility" investment in the National EPSRC XPS User's Service (NEXUS) at Newcastle University**, and will be co-located with it to increase the impact of both.

Helium Ion microscopy offers the ability to image particles and structures to better than 0.5nm resolution, with greater depth-of-field and materials contrast than in Scanning Electron Microscopy (SEM).

Secondary Ion Mass Spectrometry (SIMS) has been growing rapidly over the last 10 years. The capability we will put into place will give composition versus depth information for organic materials and bio-materials (including tissue and cells). It can image depth profile to build up a 3D image from the surface down. Buried layers, interfaces, particles, fibres etc. can be characterised in this way.

Organisation Website:	www.ncl.ac.uk

University of Oxford, Professor Roger Reed

EPSRC Equipment Account Reference:	EP/J013501/1						
Title:	Multifunctional high performance alloys for extreme environments						
Principal Investigator:	Professor RC Reed						
Lead Research Organisation:	University of Oxford						
Partner Research Organisations	None						
Department:	Department of Engineering Science and Department of Materials						
Researcher Co-investigators:	None						
Other Investigators:	AC Cocks	N Petrinic		F Hofmann		A Korsunsky	
	A Jerusalem	C Siviour		D Nowell		C Grovenor	
	P Grant	TJ Marrow		A Wilkinson		S Roberts	
	S Lozano-Perez	S Fitzgerald		M Galano		M Moody	
	R Todd	K O'Reilly					
Project Partners:	Areva			DTRA			
	Baosteel			EDF Energy			
	Rolls-Royce			Siemens			
	TIMET			Westinghouse			
	INNS			Mitsubishi Heavy Industry			
Call:	Capital for Great Technologies - Advanced Materials						
Starts:	01 July 2013	Ends:	30 September 2014		Value:	£3,524,000.00	
EPSRC Research Area Classifications:	Materials Engineering - Metals & Alloys						
EPSRC Industrial Sector Classifications:	Aerospace			Defence and Marine			
	Energy			Transport Systems and Vehicles			
Related Grants:							

Grant Summary

This proposal will establish new research infrastructure specifically designed to enable an efficient and fast model-driven methodology for the design of new metallic alloys, systems and architectures, reducing the time from alloy discovery to deployment in engineering environments. The research draws on and extends the latest developments in computational alloy design and marries it with flexible, high quality manufacturing, characterisation and test facilities designed to quickly make and evaluate new materials, while maintaining sufficient scale for efficient read-across to industrial

collaborators.

Our key applications lie in the aerospace, energy, transportation and defence sectors where current demands on structural materials mean that multifunctional performance is needed – a paradigm entirely different from traditional materials selection and use because materials suffer attack from many mechanisms of degradation. We will establish a flexible capability to design prototype metallic systems to operate in some of the harshest industrial environments: (i) under load at elevated temperatures while resisting irradiation damage; (ii) withstanding corrosive attack at ultra-high temperatures, and (iii) displaying extreme energy absorbing capacity under conditions of high strain-rate loading.

Organisation Website:	http://www.ox.ac.uk/

University of Nottingham, Professor Richard Hague					
EPSRC Equipment Account Reference:	EP/K005138/1				
Title:	Multifunctional Additive Manufacturing				
Principal Investigator:	Professor Richard Hague				
Lead Research Organisation:	University of Nottingham				
Partner Research Organisations	None				
Department:	Division of Manufacturing				
Researcher Co-investigators:	None				
Other Investigators:	Prof Morgan Alexander			Dr Christopher Tuck	
	Prof Kevin Shakesheff			Prof Ricky Wildman	
	Prof Ian Ashcroft			Prof Clive Roberts	
	Prof Phill Dickens			Prof Cameron Alexander	
Project Partners:	None				
Call:	Capital for Great Technologies - Advanced Materials				
Starts:	01 July 2013	Ends:	30 September 2014	Value:	£2,717,669.00
EPSRC Research Area Classifications	Manufacturing Technologies				
EPSRC Industrial Sector Classifications:					
Related Grants:	None				

Grant Summary

Additive Manufacturing (AM) has recently been identified by the UK government as one of 22 key future manufacturing technologies – this is echoed by the Call where “multifunctional additive layer manufacturing” equipment is specifically highlighted under the Advanced Materials stream. A key facet of AM is that, effectively, materials are being created at the point of manufacture, rather than the manufacturing process being used to simply produce or modify a topology.

Whilst this leads to a number of coupled materials / process issues and subsequent research challenges, it also offers a number of significant, but largely unexplored, opportunities in the materials field, and specifically for materials discovery. The University of Nottingham (UoN) hosts the EPSRC Centre for Innovative Manufacturing in Additive Manufacturing, which is the focus of EPSRC-funded multifunctional AM research in the UK. Building on the EPSRC Centre’s commitment to furthering discovery and understanding in this fast growing area, the vision of this proposal is to augment the capacity and capability of research into multifunctional AM and to extend the UK’s internationally recognised lead in this cutting-edge field by combining with world-leading materials discovery work from the School of Pharmacy. This vision will be achieved through investment in unique scale-up multifunctional AM production technologies with associated nano-scale characterisation equipment and by bringing together two internationally-leading research groups

(each with current research portfolios of >£10M) to facilitate ground breaking research. In addition to leading expertise in multifunctional AM,

the applicants include acknowledged leaders in the fields of biomaterials and pharmaceutics who have established a successful high throughput biomaterials

discovery programme with EPSRC, BBSRC and Wellcome Trust funding. This programme of polymeric biomaterials discovery has already resulted in major breakthroughs published in Nature Biotechnology, Nature Materials and Advanced Materials and related patent application families. The equipment proposed will enable the acceleration and scale-up of existing materials discovery research, including the reduction of lead times, into multifunctional materials discovery whilst also translating the AM approach to a new and exciting science-led application area. This combined bid is focused at maximising value and impact whilst exploiting synergies between two disciplines - multifunctional AM and biomaterials / pharmaceutics.

Organisation Website:	www.nottingham.ac.uk

University of Southampton, Professor Brian Hayden					
EPSRC Equipment Account Reference:	EP/K00509X/1				
Title:	The Development and Manufacture of Advanced Composite Materials				
Principal Investigator:	Professor Brian Hayden				
Lead Research Organisation:	University of Southampton				
Partner Research Organisations	None				
Department:	Chemistry				
Researcher Co-investigators:	None				
Other Investigators:	Professor Nikolay Zheludev		Professor Daniel Hewak		
	Professor James Wilkinson		Professor Robert Wood		
Project Partners:	Ilika Plc.		DCA Instruments Oy		
Call:	Capital for Great Technologies - Advanced Materials				
Starts:	01 July 2013	Ends:	30 September 2014	Value:	£3,317,403.00
EPSRC Research Area Classifications:	Materials Engineering - Composites				
EPSRC Industrial Sector Classifications:	Electronics		Energy		
Related Grants:	None				

Grant Summary

Capital funding will allow the establishment of a unique beyond state of the art, multisource, physical vapour deposition system for materials, and composite materials, scale-up and manufacture. New characterisation tools for these materials will also become available.
It will satisfy a world-wide need for the development of devices which incorporate a significantly wider base of materials and composites than have conventionally been used and accessed in the semiconductor, photonics and energy industries.
It provides a means of scaling composite materials for the manufacture of practical devices and a wider range of functional testing using a 150mm substrate format compatible with conventional semiconductor micro-fabrication workflows.
An Advanced Composite Materials Facility will be set up in a new specially adapted laboratory.
The specific projects enabled are in the fields of Energy Storage Recovery and Conversion, Metamaterials, Optoelectronic Structures and Devices, Amorphous Semiconductors, and Corrosion, Wear Resistant and Low Friction Materials.

Organisation Website:	soton.ac.uk