UCLAN BIOMEDICAL TECHNOLOGY (SHENZHEN) LIMITED

CONDUCTS RESEARCH AT THE INTERFACE OF BIOLOGICAL, CHEMICAL AND PHYSICAL SCIENCES, EXPLOITING THE UNIQUE ADVANTAGES OF NANOSCALE STRUCTURES AND MATERIALS TO ADDRESS REAL-WORLD CHALLENGES.

Work is being done on emerging nanotechnologies which have applications in medicine and engineering and the potential to enhance people’s lives and the environment in which we live.

Nanotechnology is a growing research area at the cutting edge of multidisciplinary science. It is characterised not only by the size of the structures being developed, but also by the need for scientists that are able to work as part of multidisciplinary teams.

This Annual Report highlights the research that has been undertaken by UCLan Biomedical Technology (Shenzhen) Limited in China during 2012 and demonstrates how working in partnership between European and Chinese organisations has helped share best practice and is contributing to tackling the real-world issues and challenges of our modern world.

Professor David A Phoenix OBE, AcSS, DSc, FRSC, FIBiol, FIMA, SFHEA
Chair, UCLan Biomedical Technology (Shenzhen) Limited
UCLan Biomedical Technology (Shenzhen) Limited
- part of the University of Central Lancashire (UCLan) group
During 2012, the main focus of activity has been on undertaking scientific activities and developing networking. Results from the science are now informing the production of research papers, a number of which have now been published, with several more in preparation. Project leads have also been increasing the impact of their research by delivering conference presentations and continuing to network within China and beyond.

During 2013, as well as continuing core scientific, publication and dissemination activities, the company is in discussions to develop further collaborations with Chinese partners.

To support its mission to develop close ties with Chinese research institutions and commercial organisations, UBTS Limited has also supported networking events in China including the hosting of the Inaugural Nanotechnology Symposium on the Virtual University Park in Shenzhen.

**UCLAN BIOMEDICAL TECHNOLOGY (SHENZHEN) LIMITED (UBTS LIMITED) DRAWS UPON INTERDISCIPLINARY TEAMS OF RESEARCHERS AND EXTENSIVE FACILITIES IN THE FOLLOWING AREAS:**

- Nanobiomaterials and Nanostructures
- Fire Behaviour of Nanocomposites and Toxicity of Nanoparticles
- Nanotechnologies for Drug, Gene and Protein Delivery
- Surface Patterning

Madam Qiu Xuan and Professor David Phoenix at the Inaugural Nanotechnology Symposium in Shenzhen.
The physical, chemical, electrical and mechanical properties of materials can be enhanced by exploiting the unique advantages that arise from the nanoscale. Synthesis, properties and applications of nanoparticles, nanostructures materials and nanocomposites are being investigated. Computer-assisted design and modelling of the behaviour and characteristics of nanostructured material formed by block copolymers, liquid crystals and colloids are being carried out. Templating methods are being investigated to produce novel structures for biocatalysts, sensors and biomarkers. Smart dispersed nanomaterials with tailored dynamic properties are promising materials for medical and engineering applications.

The Centre for Molecular and Soft Matter Modelling (CMSMM), located on the Shenzhen Virtual University Park, has been undertaking research related to the modelling of nanobiomaterials and nanostructures, with an initial focus on modelling antimicrobial peptides. Antimicrobial peptides (AMP) are of significant interest because of their potential to eliminate major problems facing medical practice such as the increasing occurrence of resistance to antimicrobial agents.

The computational work is undertaken by UBTS Limited postdoctoral researchers located at the CMSMM in Shenzhen, and is supervised by the project leader Dr Marco Pinna at UCLan, making use of UCLan high performance computing facilities in Preston, UK.

**Project Lead: Dr Marco Pinna**

Marco Pinna is a Senior Research Fellow in Computational Physics. He is an expert in molecular and coarse-grained modelling of soft matter and solid state physics. He was the winner of the Institute of Physics (UK) 2009 PhD Prize in Computational Physics.

For further information about this research area, visit [www.uclan.ac.uk/research/environment/groups/nanobiomaterials_nanostructures.php](http://www.uclan.ac.uk/research/environment/groups/nanobiomaterials_nanostructures.php)
Toxicity of Nanoparticles

The European Union’s Scientific Committee on Emerging and Newly identified Health Risks conducted studies on the risks and hazards associated with nanotechnologies, and found significant gaps in understanding the hazards associated with such products. The reports highlighted the fact that an understanding of the physiological response to nanoparticles and the dose response relationships for such responses is lacking. Our focus in this area has been the quantification of particle size distribution of nanoparticles, and the use of biochemical (enzyme assays) and biological (cell culture) models for quantification of nanoparticulate toxicity.

UBST Limited has been undertaking another project with the State Key Laboratory for Fire Science, at the University of Science and Technology of China, in Hefei, to investigate the release of nanoparticles during burning. These nanoparticles are naturally present in fire effluents, from soot particles down to very large molecules, such as fullerenes (C_{60}, C_{70} etc.). Some of these particles have the capacity to penetrate deep into the lung, and even cross the blood-gas barrier. The project is investigating any adverse impacts on health.

Project Lead: Dr Anna Stec

Anna’s recent work focused on better understanding the assessment of toxic and irritant life hazards in fires and the factors affecting fire gas toxicity. Detailed studies of the yields of fire gases and other combustion products have been undertaken in order to predict the effects of fire exposures to humans. This work has clarified the relative importance of incapacitation and lethality, and demonstrated that carbon monoxide is not the only significant toxicant in fire gas. Anna’s attendance and active participation at BSI Hazard to life from fire, and ISO Fire threat to people and environment meetings, where she has been designated as the UK’s principal expert on fire chemistry over the last four years, has given her the unique opportunity to become acquainted with the world’s leading fire toxicity experts from across the globe.

For further information about this research area, visit www.uclan.ac.uk/research/environment/groups/toxicity_nanoparticles.php
Fire Behaviour of Polymer Nanocomposites

Amongst the many and varied applications of nanotechnology, the dispersion of nanoscopic fillers to form polymer nano-composites with improved mechanical properties and fire behaviour illustrates the potential and diversity of nanoscience. Polymers decompose in different ways and fire retardants act to inhibit the decomposition or flaming combustion processes. Polymer nanocomposites form barriers between the fuel and air, reducing the rate of burning, but beyond that there is little consistency in their effects. The rheological properties of molten polymer nanocomposites are radically different from those of virgin polymers, and these profoundly affect the heat and fuel transfer through the material, often resulting in shorter times to ignition but lower peaks in the heat release rate. Most fire deaths result from inhalation of toxic gases; many who escape from fire die soon afterwards because of damage to their lungs; fire survivors often suffer injury from toxic smoke inhalation. While the majority of deaths in fires are caused by inhalation of carbon monoxide and hydrogen cyanide, the incapacitating effects of particulates and other irritants may prevent escape and thus be the reason for the deaths.

UBST Limited has been undertaking a project with the State Key Laboratory for Fire Science, at the University of Science and Technology of China, in Hefei, to develop new fire retardant materials. This project aims to understand the underlying fire retardant mechanisms, in order to develop a new generation of fire retardant additives. It is focussed on changes to physical properties; either through the incorporation of chemically active species (e.g. char promotion) or through incorporation of nanoparticles (to increase the thermal conductivity or reduce the fuel gas flow to the flame etc.). Techniques currently being investigated include the use of carbonisation catalysts and intumescence.

Project Lead: Professor Richard Hull

Richard Hull is the Professor of Chemistry and Fire Science at UC Lancaster. His expertise is in the decomposition and flammability of plastic materials. This has led him to investigate the behaviour and suitability of fire retardants for a range of plastics, and the causes of fire effluent toxicity, which is the major cause of death and injury in fires. He is internationally-leading in the field of fire science, with over 100 publications on fire retardancy and fire toxicity.

For further information about this research area, visit www.uclan.ac.uk/research/environment/groups/fire_behaviour_polymer_nanocomposites.php
NANOTECHNOLOGIES FOR DRUG, GENE AND PROTEIN DELIVERY

Drugs, genes, peptides and other bioactive molecules can be delivered to target cells and organs for the treatments of diseases such as cancers, diabetes and asthma and for responding to specific biological stimuli. Pulmonary delivery of drug, gene and protein in nanocarrier systems is a major area of interest, since the action of a drug entrapped in nanocarriers may exhibit prolonged residence time in the lung after inhalation, potentially reducing systemic side effects. We are also interested in developing nanocarrier systems for nasal delivery aiming to treat local nasal diseases (e.g. sinusitis) and systemic diseases (e.g. diabetes, hormone deficiencies etc.). Synthesis properties, computer modelling and applications of a range of functionalised nanocarriers such as dendrimers, liposomes, carbon nanotubes, cochleates and niosomes are being investigated, particularly in the area of aerosol delivery.

UBTS Limited is currently undertaking a project with Sichuan University relating to Nanotechnology for Drug Delivery mechanisms. The aims of this project are:

- To investigate the potential of drug delivery systems for treating various forms of cancers
- To further explore nanotechnologies for large scale manufacture
- To develop nanotechnologies for the delivery of novel anticancer proteins, genes and small molecules
- To correlate results and to formulate nanotechnology systems for potential future applications in clinical trials

Specific areas of interest are: PEGylated siRNA prolipoplexes for cancer therapy; PEGylated proliposomes for pulmonary delivery of anticancer macromolecules; and Graphene for delivery of anticancer drugs.

**Project Lead: Dr Abdelbary Elhissi**

Dr Abdelbary Elhissi is a Senior Lecturer in Pharmaceutics in UCLan’s School of Pharmacy and Biomedical Sciences. Abdelbary’s research is mainly focused on nanomedicines for respiratory drug delivery and the medical applications of nano and biomaterials. He is particularly interested in designing proliposome formulations for treatment of asthma and cancer. Abdelbary is also interested in clinical pharmaceutics and researching the contemporary issues of pharmacy education. He has been involved in research collaboration projects in UK, China and Middle East and has supervised more than 15 postgraduate students and more than 35 project students.

For further information about the research area, visit [www.uclan.ac.uk/research/environment/groups/drug_gene_protein_delivery.php](http://www.uclan.ac.uk/research/environment/groups/drug_gene_protein_delivery.php)
SURFACE PATTERNING

Surface patterning with chemicals and bio-chemicals on flat surfaces in the nanometer length has a fundamental importance. The applications of such nano-devices are directly related to the density and orientation of patterned chemicals and bio-chemicals on the surface. Surface patterning on particles in suspension can be a complex process due to the aggregation of the particles in suspension and their Brownian motion in the solvent. We are interested in the formation of monolayer patterned surfaces with chemical/biochemical functionalities on nanoparticles in suspension for highly specific and targeted applications such as bio-sensor, food technology, nanomedicine, magnetic bio-separation and industrial catalysis.

UBTS Limited is currently undertaking a project with Fudan University relating to Multifunctional Nanocomposites for the Separation of Pollutants from Industrial and Municipal Sewage Water. The lack of clean water has always been an issue of environmental concern all over the world. The main sources of water pollution are: i) industrial (chemical, organic and thermal wastes); ii) municipal (largely sewage consisting of human wastes, other organic castes and detergents); and iii) agricultural (animal wastes, pesticides and fertilizers). In addition to the human activity, geographical location can have an additional problem. The separation of toxic contaminants from industrial water using a solid matrix, e.g. sand, porous alumina-silicates (zeolites) and clays, has been well known for centuries due to their ion exchange properties. Removal of biological contaminants is now the key issue. This project aims to develop solutions to this problem utilising multifunctional nanocomposites using flow and static systems technologies.

Project Lead: Dr Tapas Sen

Tapas Sen is a senior lecturer in Inorganic and Materials Chemistry and the course leader of MSc Chemistry. He is leading the surface patterning group, Institute of Nanotechnology and Bioengineering. He has a foundation degree in project management (PRINCE II), which is a method endorsed by the UK government as the project management standard for public projects. He is also a Fellow of the Higher Education Academy (FHEA).

For further information about the discipline, visit www.uclan.ac.uk/research/environment/groups/surface_patterning.php
Nanobiomaterials and Nanostructures

Publications
(submitted and in preparation)

The co-operative effect of antimicrobial peptide activity in different environments (submitted)

Amidation effect of antimicrobial peptide in DMPC and DMPE Lipid bilayers (in preparation)

Conference Presentations related to UBTS

Limited projects

Professor Andreas Zvelindovski:
Block copolymer nanostructures from computer simulations, Shenzhen Virtual University Park, November 2012

Dr. Jane Wang:
Modelling of anti-microbial agents, Shenzhen Virtual University Park, November 2012

Fire Behaviour of Nanocomposites and Toxicity of Nanoparticles

Publications
(submitted and in preparation)

Siloxane based novel covalently crosslinked block copolymers with improved flame retardancy (submitted)


A Stec, TR Hull “Influence of Fire Retardants and Nanofiller on Fire Toxicity, Polymer green flame retardants: a comprehensive guide to additives and their applications (Book Chapter - submitted April 2012)


Conference Presentations related to UBTS

Limited projects

Professor Richard Hull:
Plenary Lecture on Gas Phase flame retardants, 2nd International Symposium on Flame-Retardant Materials and Technologies, Sichuan University, China Sept 2012

Professor Richard Hull:
Lecture on Fire Toxicity of Commercial Products, 2nd International Symposium on Flame-Retardant Materials and Technologies, Sichuan University, China, Sept 2012

Professor Richard Hull:
Lecture to International Forum on Fire Safe Materials in Heifei, China Sept 2012

Professor Richard Hull:
Lecture on Fire retardancy of mineral fillers in EVA copolymers, 243rd ACS Symposium, Fire and Polymers, California, USA

Professor Richard Hull:
Fire Toxicity: nanocomposites for flame retardants, Shenzhen Virtual University Park November 2012

Dr Anna Stec:
Lecture on the Influence of fire retardants on fire toxicity, 243rd ACS Symposium, Fire and Polymers, California USA

Nanotechnologies for Drug, Gene and Protein Delivery

Publications
(Published, submitted and in preparation)

J Zheng, Y Wan, A Elhissi, Z Zhang, X Sun: Targeted paclitaxel delivery to tumors using cleavable PEG-conjugated solid lipid nanoparticles (submitted)


A Facile One-Step Approach to Preparing Anticancer Nanoemulsions for Brain Tumour Therapy - (In preparation)

Conference presentations related to UBTS

Limited projects

Dr Abdelbary Elhissi:
Proliposomes: A promising formulation approach of liposomes for the treatment of Brain Tumour; BIT 6th Annual World Cancer Congress 2013, Shenzhen Virtual University China

Dr A Elhissi:
Drug delivery and nanocarrier systems for treatment of asthma and cancer. Shenzhen Virtual University Park, November 2012

Surface Patterning

Publications
(Published, submitted and in preparation)

M Howard, J Whittle, F Zhang, DY Zhao, T Sen: Microwave assisted oxidation catalysis of bulky organic molecules using hierarchically ordered porous Vanado-Silicate Nanocomposites (Published, submitted and in preparation)

M Howard, J Whittle, F Zhang, DY Zhao, T Sen: Novel Hierarchically Ordered Porous Vanado-Silicate Nanocomposites for the Application in Industrial Catalysis, Proceedings on NSTI Nanotech 2012, San Jose, California, USA, June 2012 (peer-reviewed conference proceedings)


ME Sharifabad, M Howard, G Morton, T Mercer, L Wang, F Zhang, DY Zhao, G Hogben; T Sen: Mesoporous Silica Based Multifunctional Nanocomposite for Water Purification, (manuscript under preparation)

Conference Presentations related to UBTS

Limited projects

Dr Tapas Sen:
Nanocomposites based Clean Water Technology; International Conference in Nanoscience and Nanotechnology; (NSTI 2013) Washington DC, USA May 2013 (Invited keynote speaker)

Dr Tapas Sen:
Nanotechnology in Health, Environment, Industrial and Forensic Science; Indian Association for the Cultivation of Science, December 2012

Dr Tapas Sen:
Nanotechnology in Health and Environmental Sciences; Tata Chemicals Ltd, India, December 2012

Dr Tapas Sen:
Nanotechnology in Health, Environment, Industrial and Forensic Sciences; National Chemical Laboratory Innovation Hub, India, December 2012

Dr Tapas Sen:
Nanotechnology in Health, Environment, Industrial and Forensic Sciences; Shiv Nadar University, India, December 2012

Dr Tapas Sen:
Water Treatment - nanocomposites for the treatment of industrial and municipal sewage water; Shenzhen Virtual University Park, China, November 2012

Dr Tapas Sen:
INAUGURAL NANOTECHNOLOGY SYMPOSIUM

The first Nanotechnology Symposium was held on the Virtual University Park in Shenzhen, China, on 20 November 2012. The one day symposium showcased the impressive results one year after the launch of the Institute. It was attended not only by UCLan and Chinese academics, but also by high level representatives of the local government, Chambers of Commerce and Foreign Consulates. The Symposium included a full programme, with the opening address delivered by Madam Qui Xuan, representing Shenzhen Science and Technology Innovation Committee.

Details of programme

Welcome and introductions
Professor David Phoenix, Deputy Vice-Chancellor, University of Central Lancashire

Speech
Madam Qiu Xuan, Shenzhen Science and Technology Innovation Committee
Professor Waqar Ahmed, Overview of Institute of Nanotechnology and Bioengineering at UCLan

Drug Delivery
Nanotechnology for drug delivery to the lungs – Dr Abdelbary Elhissi, UCLan; Dr Ka-Wai Wan, UCLan; Associate Professor Sun Xun, Sichuan University

Fire Toxicity
Nanocomposites for flame retardants – Professor Richard Hull, UCLan; Professor Yuan Hu, USTC

Water Treatment
Nanocomposites for the treatment of industrial and municipal sewage water – Dr Tapas Sen, UCLan; Professor Fan Zhang, Fudan

Block copolymer nanostructures from computer simulations
Professor Andrei Zvelindovski, UCLan

Modelling of anti-microbial agents
Dr Jane Wang, UCLan Biomedical Technology (Shenzhen) Limited

A 2nd Nanotechnology Symposium is currently being planned - if you would like to be on the mailing list to receive details of this event, please contact MinYi Hu in the Shenzhen Office - Mhu@uclan.ac.uk

UBTS FACILITIES

UBTS Limited has dedicated offices at the Shenzhen Virtual University Park. Established in September 1999, Shenzhen Virtual University Park is an innovative development of the Shenzhen Municipal Government of strategic significance. The SZVUP consists of over 54 famous domestic and foreign universities, and provides a platform for the development of high calibre personal, incubation of universities project and transformation of research achievements. It also supports the co-operation of science and education between Shenzhen and Hong Kong.

UBTS Limited has use of high performance computing facilities and access to high specification nanophysics, pharmacy, fire engineering, and computational physics laboratories at UCLan. A number of current projects include plans for Chinese postdocs to undertake a period of work on UCLan premises to complement work done in China.
The University of Central Lancashire (UCLan) has a long history of working in partnership with key Chinese universities. In 1993, UCLan was one of the first UK universities to establish a joint programme with a Chinese partner university, and it continues to develop key strategic relationships within China and to welcome Chinese students to its Preston Campus.

UCLan was the first British university invited to establish a presence on the Shenzhen Virtual University Park, with a formal opening ceremony attended by Chairman of the University Board, Mr Brian Harris. This led to the establishment of UCLan Biomedical Technology (Shenzhen) Limited, UBTS, a separate company formed with the purpose of promoting world-leading nanotechnology research activities and partnerships within China. The SZVUP is the key strategic hub for UBTS, bringing together the various strands of UBTS research being undertaken throughout China, and is the base for UBTS Head of Institute (David Fong). The Shenzhen Virtual University Park is also home to the UBTS Centre for Molecular and Soft Matter Modelling, which was set up in November 2011.

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Professor David Phoenix (Chair)
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Graham Hardman

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For further information about UCLan, visit www.uclan.ac.uk
For further information about research at UCLan, visit www.uclan.ac.uk/research
For further information about the Shenzhen Virtual University Park visit www.szvup.com/english
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兰开夏生物医药科技(深圳)有限公司在生物学、化学和物理学交叉学科进行研究，探讨纳米结构和材料的独特优势来解决实际难题。
兰开夏生物医药科技(深圳)有限公司(UBTSL) - UCLAN工作

组重要成员

中央兰开夏大学(UCLan)与中国的重点大学具有长期合作历史。1993年,UCLan是首批与中国大学建立合作项目的英国大学之一,当前仍继续保持与中国的战略关系,并欢迎中国学生到兰开夏大学留学。

UCLan是第一个受邀入驻深圳虚拟大学园的英国大学,大学董事会主席Brian Harris先生也正式出席了开幕式。这一举动促成了兰开夏生物医药科技(深圳)有限公司(UBTSL)的成立,这是一家独立的公司,其目的是促进与中国合作进行世界领先的纳米技术研究。深圳虚拟大学园是UBTSL的关键策略,将目前在中国进行的各项UBTSL研究进行融合,这也是UBTSL研究所主任(David Fong)的基本职责。

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如需获得深圳虚拟大学园的更多信息，请访问: www.szvup.com/english
首届纳米技术专题会于2012年11月20日在中国深圳虚拟大学园顺利召开。当天的会议展示了研究所成立1年后取得的显著成果。该会议不仅有UCLan和中国学者参加，同时还有当地政府、商会和外国领事馆的高规格代表。

专题会包括全部日程，首先由邱宣女士代表深圳科技创新委员会发表讲话。详细日程欢迎词和简介中央兰开夏大学副校长David Phoenix教授演讲。深圳科技创新委员会邱宣女士Waqar Ahmed教授，介绍UCLan的纳米技术和生物工程研究；Abdelbar Elhissi博士，UCLan；Kwai-Wai Wan博士，UCLan；孙逊副教授，四川大学；Richard Hull教授，UCLan；胡源教授，USTC；Tapas Seb博士，UCLan；张凡教授，复旦大学；Andrei Zvelindovski教授，UCLan；王建萍博士，UBTSL。

当前正计划第二届纳米技术专题会。如果您希望通过邮件获得相关信息，请联系深圳办公室的Min Yih-Mhu@uclan.ac.uk。
药物、基因和蛋白给药纳米技术

药物、基因和蛋白给药纳米技术

纳米复合物的燃烧行为和纳米颗粒的毒性

纳米生物材料和纳米结构

纳米生物材料和纳米结构
使用化学物和生物化学物在平整表面形成纳米尺度的图案非常重要。该类纳米器械的应用直接与表面化学物和生物化学物的密度和排列方向直接相关。悬浮液中颗粒表面成图是一个复杂过程，因为颗粒在悬浮液中聚集并发生布朗运动。我们感兴趣在于，在悬浮液的纳米颗粒上用化学物/生物化学物功能团形成单层图案，用于高度专一和靶向应用，例如生物探针、食品技术、纳米医学、磁性生物分离和工业催化。

UBTSL当前正与复旦大学开展多功能纳米复合物的研究，从工业废水和城市下水道水中分离污染。缺乏清洁水始终是全世界担忧的环境问题。水污染的主要来源为：i) 工业的（化合物、有机物和热学废物）；ii) 城市的（大部分污水包括人类排泄物、其他有机废物和去污剂）；以及iii) 农业的（动物排泄物、杀虫剂和肥料）。

除了人类活动，地理位置也会产生其他问题。使用固体基质从工业废水中分离毒性污染物，固体基质包括沙子、多孔性氧化铝-硅酸盐（沸石类）和粘土，由于其离子交换特性，几个世纪以来这些固体基质已被人们熟知。移除生物污染物是当前的关键问题。该项目的目的是使用流动和静态系统技术，以多功能纳米复合物解决该问题。

项目主管: Tapas Sen博士
Tapas Sen是无机和材料化学的高级讲师，以及MSc化学部的主管。他主管纳米技术和生物工程研究所表面图案研究组。他还拥有项目管理学位（PRINCE II），其也是英国政府批准用于公共项目的项目管理标准方法。他也是英国高等教育学会会员(FHFE)。

如需获得该研究领域的更多信息，请访问: www.uclan.ac.uk/research/environment/groups/surface_patterning.php
药物、基因和蛋白质递送的纳米技术

药物、基因、多肽和其他生物活性分子可以递送到靶细胞和器官，从而治疗疾病，例如癌症、糖尿病和哮喘，以及对特定生物学刺激有响应。

使用纳米载体系统在肺部递送药物、基因和蛋白质是主要研究领域，因为吸入肺部后，纳米载体中的药物活性可以长时间保持，从而可能减轻全身副作用。

我们还研制鼻部递药的纳米载体系统，以治疗鼻部局部疾病（例如鼻窦炎）和全身疾病（例如糖尿病、激索缺乏等）。正在对一系列各功能性纳米载体的合成特性、计算机模拟和应用进行研究，例如树枝状物、脂质体、碳纳米管、螺旋体、泡泡囊，尤其是气溶胶递药领域。

UBTSL当前正与四川大学开展药物递送机制的纳米技术研究，目标如下：

• 研究药物递送系统治疗各种癌症的可能性。
• 进一步研究纳米技术便于进行大规模生产。
• 研究纳米技术用于递送新型抗癌症蛋白、基因和小分子。
• 将结果进行关联并制作纳米技术系统，以研究将来在临床试验中的应用。

具体相关领域包括癌症治疗的PEGylated siRNA脂质体混合物；肺脏递送抗癌大分子的PEGylated脂质体前体；以及递送抗癌药物的石墨烯。

项目主管：Abdelbary ElHissi博士

Abdelbary ElHissi博士是UCLan药学和生物医学学院制药学系的高级讲师。他的研究领域主要为呼吸系统药物递送的纳米医学和纳米材料以及生物材料的医学应用。他尤其对治疗哮喘和癌症的脂质体前体设计感兴趣。他也喜欢研究临床制药学以及制药学教育的当代问题。他参与英国、中国和中东地区的研究合作项目，并督导超过15位博士后和35位进行项目研究的学生。

如需获得更多关于该研究领域的信息，请访问：www.uclan.ac.uk/research/environment/groups/drug_gene_protein_delivery.php
聚
合纳米
复
合物的
燃烧
行为
在纳米技术
多个
不同
应用
领域
中,纳米
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散
形成纳米
聚合物,其
机械
特
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改善,
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潜能
和
多样性。
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。纳米
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部分
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物的
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作用
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阻碍
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死亡
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UBSTL
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验
室合
作进行了
另
一个项目,
以
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新型阻燃
材料。
该
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是了解潜在的
燃烧延迟机
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从而
研制
新
一代阻燃
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是物理特
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融入化学
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如
碳
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成)
或
纳米
颗粒合并(增
加热
传导性
,或减少
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料
气体向火焰
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等)
。当前研究的技术
包括使用
碳
化
催
化剂
和
膨
化剂。
纳米复合物的燃烧行为和纳米颗粒的毒性

新兴的和最确定的健康风险

欧盟科学委员会对纳米技术相关风险和危险进行了研究，发现对该类产品相关危险方面的理解存在重大差异。报告强调，目前缺乏对纳米颗粒的生理学反应和该类反应的剂量反应关系的认识。我们在这个领域重点关注如何定量纳米颗粒的粒径分布，以及使用生物化学（酶含量测定）和生物学模型（细胞培养物）定量纳米颗粒毒性。

UBSTL已与合肥中国科技大学火灾科学国家重点实验室进行了另一个项目，以研究燃烧时纳米颗粒的释放。这些纳米颗粒自然存在于火灾流产物中，包括煤烟颗粒和非常大的分子，例如富勒烯（C60和C70等）。这些颗粒的一部分可以深入到肺部，甚至穿过血气屏障。该项目主要研究对健康的不良影响。

项目主管：Anna Stec博士

Anna近期工作主要是更好地了解火灾中毒性弹性和刺激性物质的评估，以及影响火灾气体毒性的因素。对火灾气体和其他燃烧产物进行详细研究，以预测火灾发生对人类的影响。该研究对残疾和致死的相对重要性进行了分类，表明一氧化碳并不如火灾气体中唯一的重要毒性物质。Anna积极参加BSI Hazard和ISO Fire环境会议，因此在过去的四年中，她被指定为这些会议的火灾化学首席专家，同时成为熟悉全世界顶尖火灾毒性专家。如需获得该研究领域的更多信息，请访问：www.uclan.ac.uk/research/environment/groups/toxicity_nanoparticles.php
纳米生物材料和纳米结构

纳米生物材料和纳米结构的物理、化学、电学和机械性能均可通过开发纳米级独特优势来增强。当前正在研究纳米颗粒、纳米结构材料和纳米复合物的合成、特性和应用。当前正在通过计算机辅助设计和模拟嵌段共聚物、液晶体和胶体组成纳米结构材料的行为和特性。研究制模方法以生成生物催化剂、生物探针和生物标记物的新型结构。灵活分散的纳米材料是一种有前景的材料，可应用于医学和工程学。

分子和软物质模拟中心(CMSMM)位于深圳虚拟大学园，正在进行有关纳米生物材料和纳米机结构的模拟研究，开始的研究焦点为模拟抗菌肽。抗菌肽(AMP)具有重要价值，因为AMP可以解决医学实践中的一些重大问题，如抗菌药物耐药性不断增加。利用英国普林斯顿大学的UCLan高性能计算设施，由深圳CMSMM的UBTSL博士后研究者开展计算工作，同时由UCLan项目主管Marco Pinna博士进行监督。

项目主管:Marco Pinna博士

Marco Pinna是计算物理学的高级研究员。他是软物质和固体物理学的分子和粗粒模拟方面的专家。他也是计算物理学物理研究所(UK)2009 PhD奖的得主。

如需获得该研究领域的更多信息，请访问:

www.uclan.ac.uk/research/environment/groups/nanobiomaterials_nanostructures.php
2012年，主要活动是进行科学研究和发展网络。获得的科学成就就是发表了大量鼓舞人心的研究论文，其中部分论文已经发表，还有一些正在撰写。项目主管也通过开会演讲以及在中国及其他地区构建网络来增强研究的影响力。

2013年，除了继续进行关键科学研究和宣传活动外，公司正在讨论与中国合作方加深合作。为了与中国研究机构和商业组织形成密切联系，UBTSL还支持在中国建立网络交流活动，包括在在深圳虚拟大学园主办的首届纳米技术专题会。

兰开夏生物医药科技（深圳）有限公司（UBTSL）组建多学科研组，并在以下领域建立了齐全设施：

- 纳米生物材料和纳米结构
- 纳米复合物
- 表面规律
- 药物、基因和蛋白质递送的纳米技术
兰开夏生物医药科技(深圳)有限公司(UBTSL)在生物学、化学和物理学交叉学科进行研究，探讨纳米结构和材料的独特优势来解决实际难题。正在对新兴纳米技术进行研究，纳米技术不仅可以应用于医学和工程学，还可以改善人们的生活和环境。纳米技术的研究得到了极大发展，并在多学科交叉领域具有领先优势。其突出特点不仅仅在于研究结构的大小，还需要多学科交叉领域的众多专家开展团队协作。

该年度报告重点放在2012年中国UBTSL进行的研究，同时证明欧洲和中国机构开展合作帮助大家分享最佳实践，以及帮助解决实际问题和当代高科技时代的问题。

David A Phoenix教授 OBE, AcSS, DSc, FRSC, FIBiol, FIBEA
UBTSL主席
UBTSL-中央兰开夏大学(UCLan)研究组重要成员

兰开夏生物医药科技(深圳)有限公司
年度报告2012