

# *School of Engineering University of Bolton UK*

*Professor Danny Morton*

*Head of School*

School of  
Engineering



# About Me

- *Over 40 years experience in HE*
  - *20 years University of Huddersfield*
  - *24 years University of Bolton - Various posts, Dean, Director of Enterprise & Research - Currently Head of School of Engineering.*
- *Significant industrial experience through collaborative research projects, teaching Company Schemes and Knowledge Transfer Partnerships (KTP's)*
- *PhD 1978.*
- *Chartered Engineer, FIET.*
- *QAA Auditor/Reviewer.*
- *Reviewer for National Council for Academic Accreditation in Saudi Arabia (NCAAA).*
- *Developed University of Bolton's first distance learning programme in Advanced Microelectronics in 1996- Funded by EPSRC.*
- *Numerous research grants and contracts.*
- *Supervised over 35 PhD's to successful completion.*
- *Developed collaborative link with University of South-Westphalia in 1996.*
- *Led University of Bolton off-campus research centres in Germany, Malawi, Zambia, Ras Al Khaimah, and Greece.*
- *Worked as consultant to Arden University (Private distance learning University in UK) - Successfully led their bid for Degree awarding powers.*

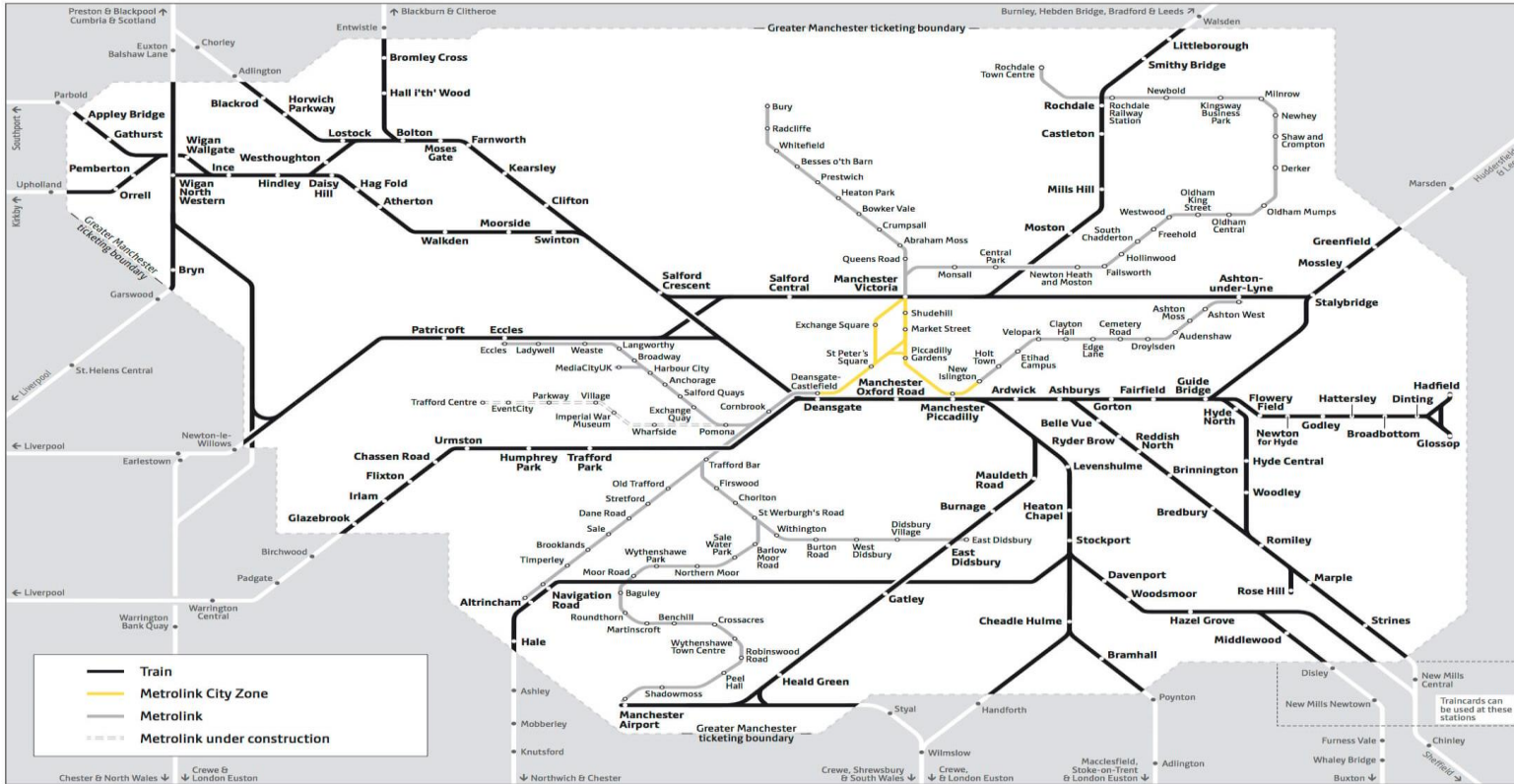
# Bolton - Greater Manchester



# Bolton Surrounding Area



# Transport





# Travelling from Bolton

- Manchester-22km, 30 mins by train, cost c£3.00 return
- Manchester Airport-35km, 40 mins by train, cost c£4.00 return
- Liverpool - 60km, 1hr by train, cost c£8.00 return
- London - 350km, 2.5 hr by train. Cost c£50.00 return
- Lake District & Dales - 60km

# *The University of Bolton*



# *The University of Bolton*





# *University - Institute of Management*



# *University Halls*





# Bolton ONE - Health Centre & Sports



# *University of Bolton - New Headquarters*





# £40m *Student Village Development*



# *Bolton Countryside*





# *The University of Bolton Football Stadium – Bolton Wanderers*



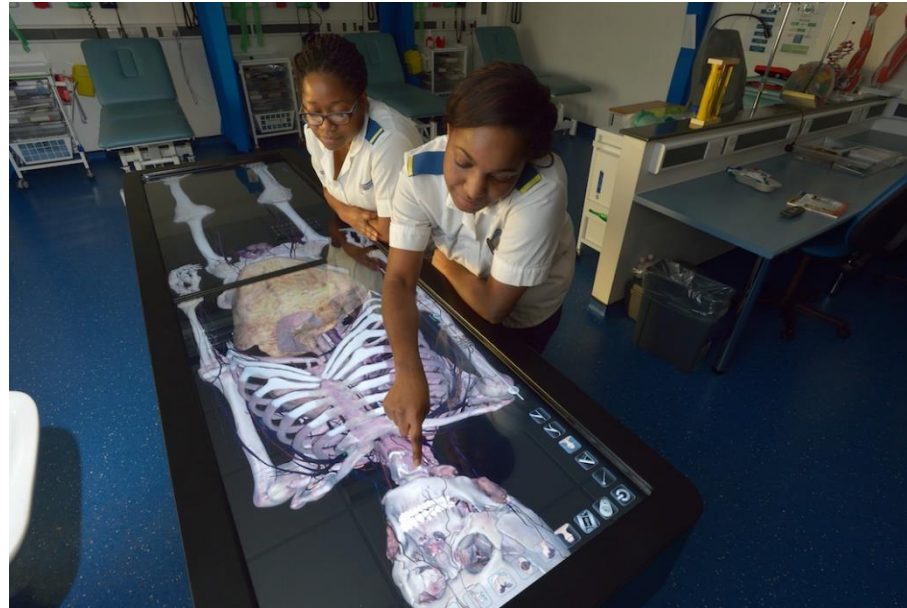
# *The University [www.Bolton.ac.uk](http://www.Bolton.ac.uk)*

*Circa - 8000 students. Located on 3 campuses in Bolton  
Schools/Faculties*

- *School of Engineering, including National Centre for Motorsport Engineering*
- *Arts*
- *Creative Technologies*
- *Law*
- *Sport & Biological Sciences*
- *Institute of Management*
- *Faculty of Health & Wellbeing = Nursing Dental Technology*
- *Education*
- *Psychology*
  
- *Off\_Campus locations throughout the world - e.g. Malawi, Zambia, Sri-Lanka, Ras Al-Khaimah, Shanghai, Kuala Lumpur, Athens, Prague, South Westphalia etc.*



# *Strong Performance For University Of Bolton In National Student Survey (NSS)*



<https://www.bolton.ac.uk/strong-performance-for-university-of-bolton-in-national-student-survey-nss/>

# *University Of Bolton Storms Up Whatuni\* National League Table, And Takes First Place In Greater Manchester*



<https://www.bolton.ac.uk/university-of-bolton-storms-up-whatuni-national-league-table-and-takes-first-place-in-greater-manchester/>

# University Of Bolton Scores For 'Student Satisfaction' In Complete University Guide 2019



<https://www.bolton.ac.uk/university-of-bolton-scores-for-student-satisfaction-in-complete-university-guide-2019/>



# *University Of Bolton Ranked 6th Overall In UK Engagement Survey 2018*



<https://www.bolton.ac.uk/university-of-bolton-ranked-6th-overall-in-uk-engagement-survey-2018/>



# Stop Press

- *The University of Bolton is featured in The Times and The Sunday Times Good University Guide 2019 highlighting that students rate their teaching among the best in the UK.*
- *The guide says that in the most recent National Student Survey, students ranked Bolton fourth in the UK for satisfaction with teaching quality under a Sunday Times analysis of the outcomes.*

# *Engineering Heritage at Bolton*

- *Established 1825 as Mechanics' Institute*
- *Bolton Institute of Technology - 1963*
- *Bolton Institute of Higher Education - 1982*
- *Incorporated in 1989*
- *Degree awarding powers 1992*
- *Research Degree awarding powers 1995*
- *University title in 2005*

# Our New Engineering Building

£13m Development 2017



# *National Centre for Motorsport Engineering*





# *Recent Investment in Facilities*

- *Recent circa £1 Million invested in facilities for engineering*
- *Centre for Advanced Performance Engineering*
- *Electrical and Electronic Engineering laboratories*
- *Projects workshop*
- *CNC machinery*
- *New facilities planned for Civil Engineering and Construction this year*

# *School of Engineering Programme Areas*

- *Automotive / Motorsport*
- *Bio Medical Engineering*
- *Civil Engineering*
- *Construction Project Management*
- *Electrical & Electronic Engineering*
- *Mathematics*
- *Mechanical Engineering*
- *Mechatronics*
- *Systems Engineering*



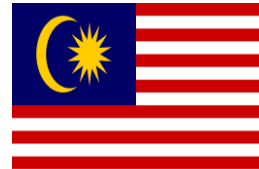
*Programmes from Foundation Programme through to PhD*

# School of Engineering Programmes

- **BEng** – Mechanical, Electrical & Electronic, Civil Engineering, Bio-Medical Engineering, Automotive - All accredited by professional bodies (Full-Time & Part-Time)
- **BSc** – Construction Project Management & Motorsport Technology
- **MSc** – Systems Engineering and Engineering Management – Mechanical, Electrical & Mechatronics.
- **MRes** – Engineering Management & Environmental Management
- All undergraduate programmes in top-up mode with summer school attendance.
- <https://www.bolton.ac.uk/subject-areas/all-subjects/>

# Multidisciplinary International Staff Team

- Our staff come from over 10 different countries bringing an international dimension to all our programmes
- We have collaborative partners delivering our programmes throughout the world





# Professional Body Accreditation

The *Institution*  
of *Structural*  
*Engineers*



INSTITUTE OF  
HIGHWAY  
ENGINEERS

ice



CIHT



The Institution of  
Engineering and Technology



chartered association  
of building engineers



Engineering  
Council



**CIOB**  
THE CHARTERED INSTITUTE OF BUILDING

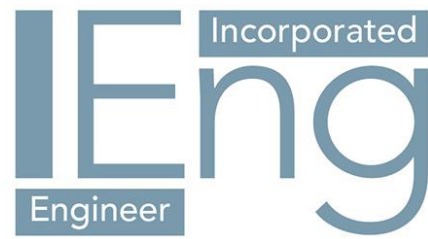


Institute of  
mathematics  
& its applications



Institution of  
**MECHANICAL**  
**ENGINEERS**

# *Professional Registration*



# Our Ethos

- *We deliver a wide range of taught undergraduate & Postgraduate programmes.*
- *Strong research background, delivering a number of PhD's both and on campus, and off-campus with collaborative partners.*
- *Strong ethos of working with industry*
- *All undergraduate programmes developed as UK Apprentice Degrees for delivery to industrial based students.*
- *Track record of delivering KTP's (UK Government sponsored - Knowledge Transfer Partnerships)*
- *Up to date modern facilities with dedicated Engineering building.*
- *Majority of staff practice based with significant industrial and research experience.*
- *Over 90% staff qualified at Doctorate Level or Chartered Engineers.*

# *Strong Links with Industry*

- *Industrial Advisory Board helps develop our programmes*
- *Research Projects*
- *Help with placements*
- *Good employment record for all our students*
- *Apprenticeship programmes*
- *Links with employer groups*



# *Our Approach to Teaching*

- *Small Class sizes -Less than 30 students in most cases*
- *Lots of individual support*
- *Industrially relevant curriculum*
- *Dedicated team of mathematicians*
- *Enhanced Personal Tutor System*
- *Specialist study support modules on a range of topics*
- *Formative assessment policy with lots of feedback*
- *A focus on innovation and problem solving in all programmes*
- *Teaching Intensive Research Informed (TIRI)*

# *Teaching Intensive Research Informed*

- Our principal focus is on teaching and supporting students*
- We like all our staff to engage in research*
- We have a strong research profile with over 70% of our research deemed to be of international standing and excellent in the last Research Excellence Framework*
- The research activity helps our staff to be up to date in their teaching*
- We challenge students with industrially relevant problems*

# *MRes – Master of Research*

- *A UK based Level 7 qualification focussing on research training.*
- *A Foundation for a research career in industry and study at PhD level.*
- *Can give advanced standing for entry into a Doctorate programme.*
- *Study modes – Full-Time and Part-Time.*
- *Industry based.*

# Origins of the MRes – Master of Research

Borne out of our successful off-campus PhD Programme

- Currently being delivered in:
  - Malawi
  - Zambia
  - Greece
  - Germany
  - Ras Al-Khaimah
- Based on practitioner model where students work full-time in industry or in industrial led research centres, combining practice with research.
- Supported by University led workshops within the off-campus centres.
- Each year culminates in a Research Conference where all students present with industry and external stakeholder presence.



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# *MRes Philosophy*

- *Research Methods core to the programme.*
- *Practice based – combining industrial practice with academic study and research.*
- *A problem solving philosophy.*
- *Work towards publishable research outcomes.*
- *Culminates in a Conference where all students present a paper based on their research and industrial practice.*

# *MRes – Master by Research*

Master by Research (MRes)	Final Award	Level 7	Environmental Management
Postgraduate Diploma (PgDip)	Exit or Fallback Award	Level 7	Environmental Management
Postgraduate Certificate (PgCert)	Exit or Fallback Award	Level 7	Environmental Management

# *MRes Programme Specification*

- <http://programmes.bolton.ac.uk/ENG006-F-UOB-MX-01>
- <http://programmes.bolton.ac.uk/CIE007-F-UOB-MX-01>



# Validated Modules – Engineering Management

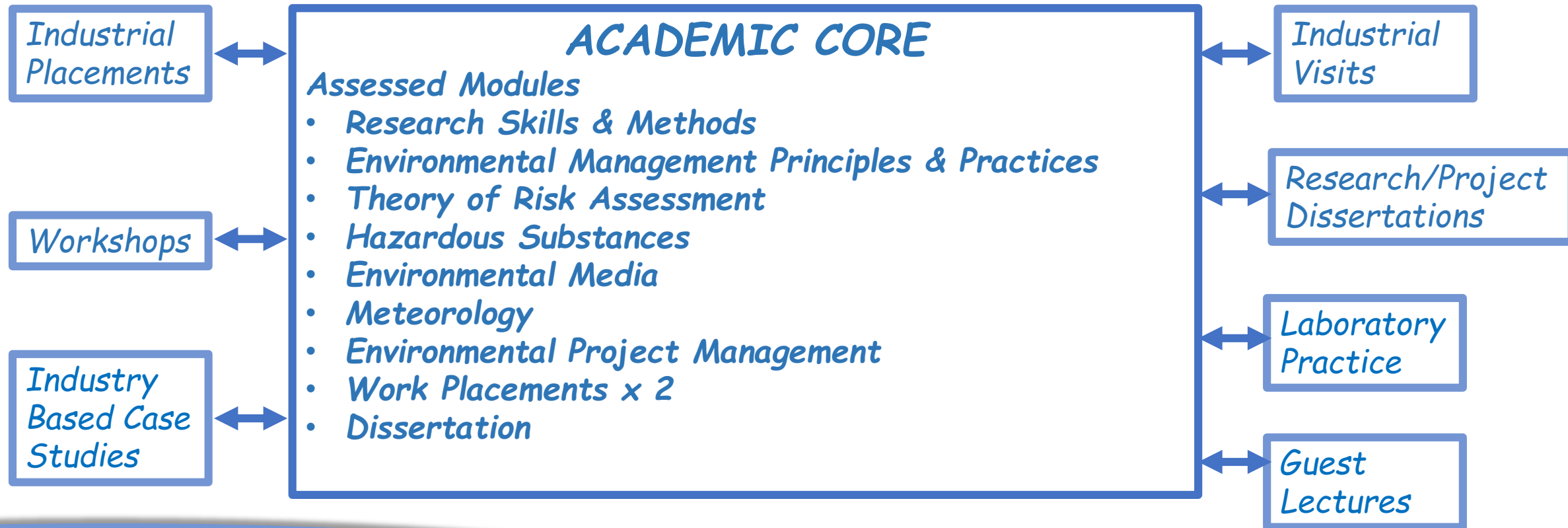
<i>Title</i>	<i>Module Code</i>	<i>Credits</i>
<i>Research Skills and Methods</i>	<a href="#"><u>ENG7000</u></a>	<i>Core - 20</i>
<i>Integrated Management Systems</i>	<a href="#"><u>ENG7001</u></a>	<i>Optional -20</i>
<i>Project Management</i>	<a href="#"><u>ENG7002</u></a>	<i>Optional-20</i>
<i>Business and Management in Engineering</i>	<a href="#"><u>ENG7003</u></a>	<i>Core-20</i>
<i>Work-based Project 1</i>	<a href="#"><u>ENG7004</u></a>	<i>Core-20</i>
<i>Work-based Project 2</i>	<a href="#"><u>ENG7005</u></a>	<i>Core-40</i>
<i>Dissertation</i>	<a href="#"><u>ENG7006</u></a>	<i>Core-60</i>
<i>TOTAL Credits</i>		<i>180 (incl. 1 option)</i>

# Validated Modules – Environmental Management

<i>Title</i>	<i>Module Code</i>	<i>Credits</i>
Research Skills and Methods	<a href="#"><u>ENV7000</u></a>	Core - 20
Environmental Management Principles and Practices	<a href="#"><u>ENV7001</u></a>	Core - 20
Theory of Risk Assessment	<a href="#"><u>ENV7002</u></a>	Optional -20
Hazardous Substances	<a href="#"><u>ENV7003</u></a>	Optional-20
Environmental Media	<a href="#"><u>ENV7004</u></a>	Optional-20
Meteorology	<a href="#"><u>ENV7005</u></a>	Optional-20
Environmental Project Management	<a href="#"><u>ENV7009</u></a>	Optional-20
Work-based Project 1	<a href="#"><u>ENV7006</u></a>	Core-20
Work-based Project 2	<a href="#"><u>ENV7007</u></a>	Core-40
Dissertation	<a href="#"><u>ENV7008</u></a>	Core-60
<i>TOTAL Credits</i>		<i>180 (incl. 1 option)</i>

# MRes Structure & Delivery

60 Credits - Taught  
120 Credits - Work  
based/Research



# Current School Research Partners

*DSTL/EMA(France) UK-France Partnership 2016- to date*

*Hylomar-KTP (MPhil Student) 2017-19*

*Walker seals Cumbria (PhD/MSc students) 2015 to date*

*Shanghai University (PhD exchange) 2005 to date*

*US Police force (PhD Student) 2014 to date*

*ITECH France 2002 to date*

*South Westphalia University of Applied Sciences for Engineering Systems/Renewables Systems-MSc/PhD dual awards 1998-to date ( 25 PhDs and > 500 MScs)*

*Oxford Brookes(MORTEC), Albatec, Williams F1 2017*

*KCMC Darsbury, Manchester, Bristol & Liverpool Universities 2014-onwards*

*Philips Medical Instruments 2017*

*Keating Supercars*

# *EE Research Activities*

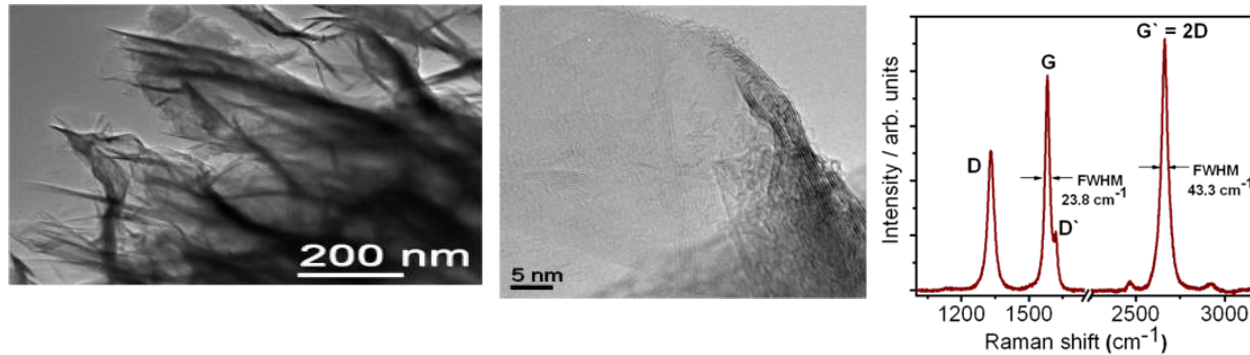
1. *Nanomaterials: ZnO, TiO<sub>2</sub>, CNTs, graphene etc*
2. *Processing (ALD, PVD) and devices*
3. *Sensors, microfluidics & lab-on-chip systems*
4. *Flexible, dissolvable, transitional electronics*
5. *Energy harvesting devices & wireless power transfer*
6. *Wireless, self-powered and passive sensors*
7. *Wireless sensing for healthcare and medicine*
8. *Expert systems*



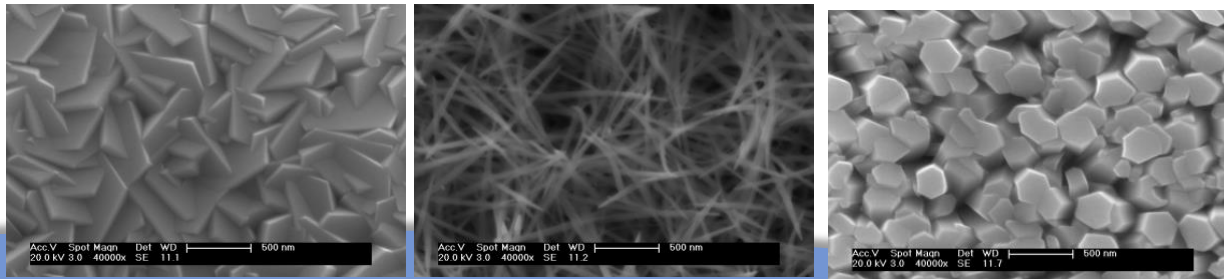
# Nanomaterial synthesis & applications

Able to synthesize/process nanomaterials: ZnO, TiO<sub>2</sub>, MnO, graphene, graphene oxide, CNTs

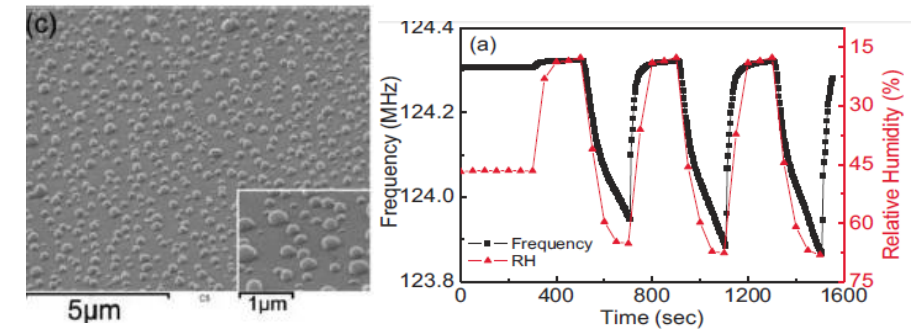
## Vertically Aligned Graphene (FLG) Synthesis



## ZnO nanorods and devices

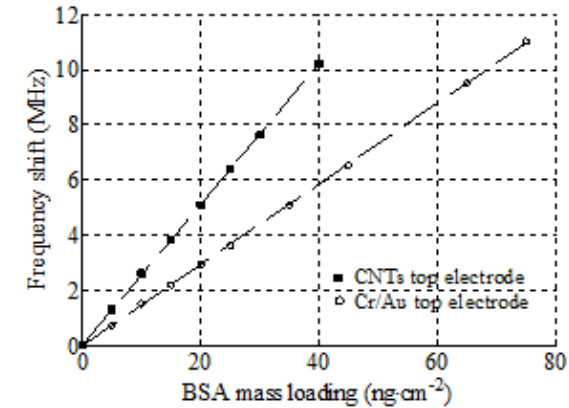
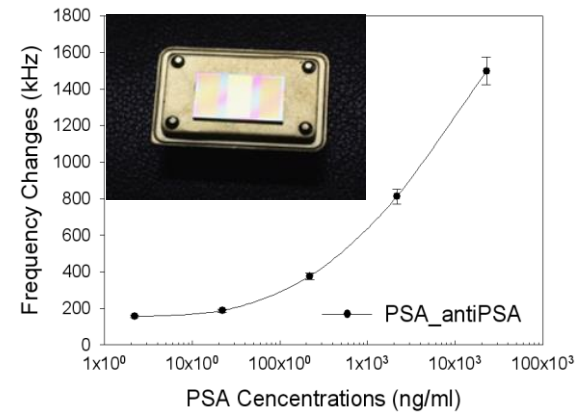
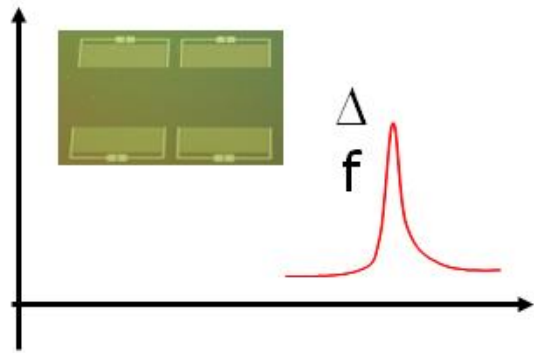


## Silver nanoparticles/H-sensors

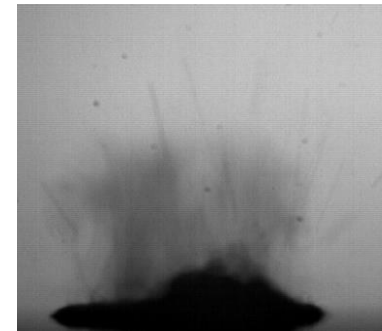
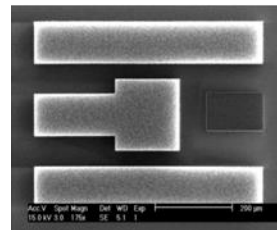
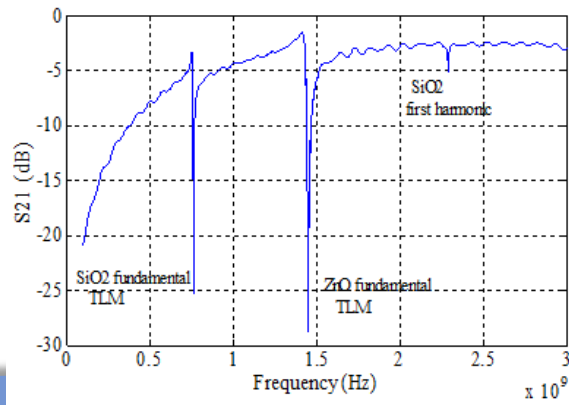


# Physical and Biochemical sensors

## SAW Biosensor for PSA sensing

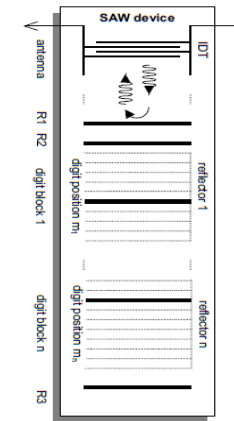
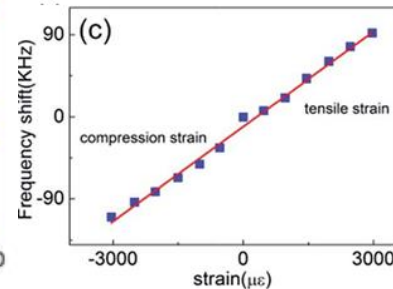
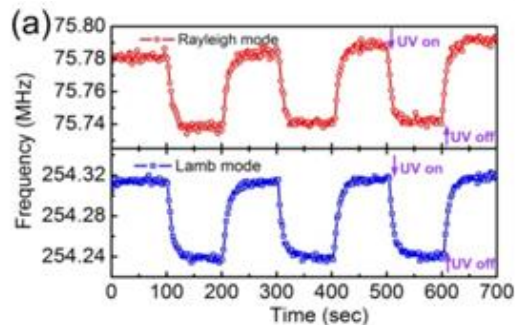
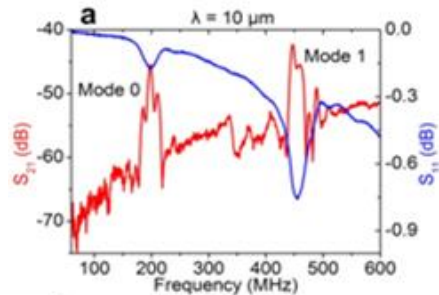
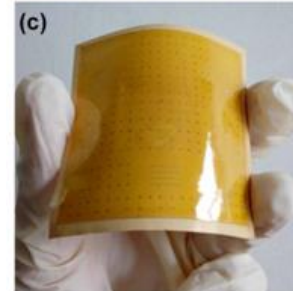
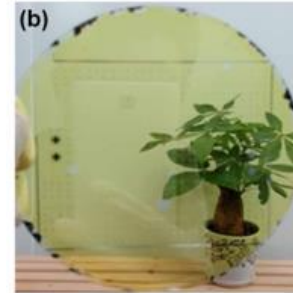
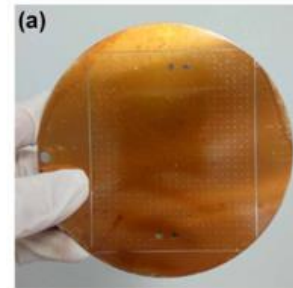
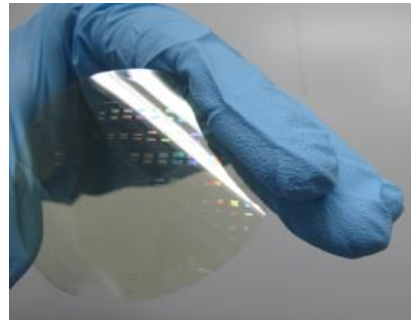
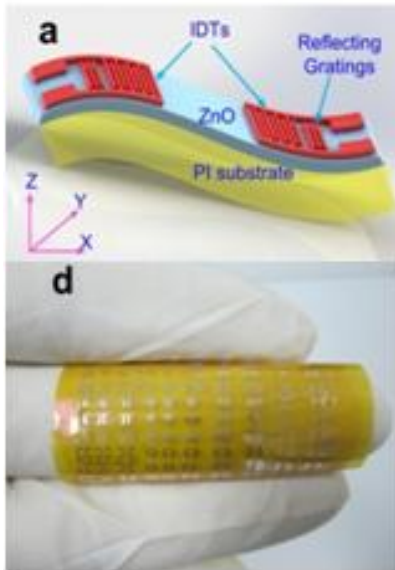


## SAW atomizer, pump, particle concentration

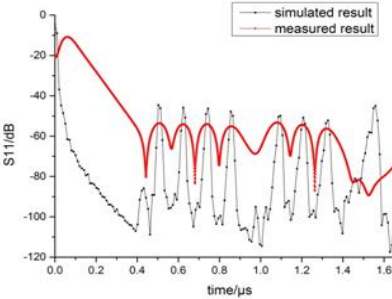
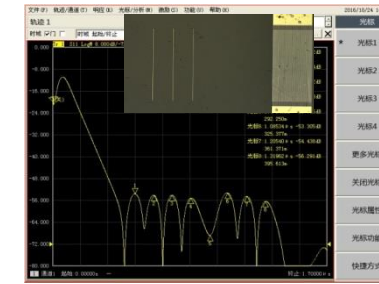


# Flexible/Transparent Sensors

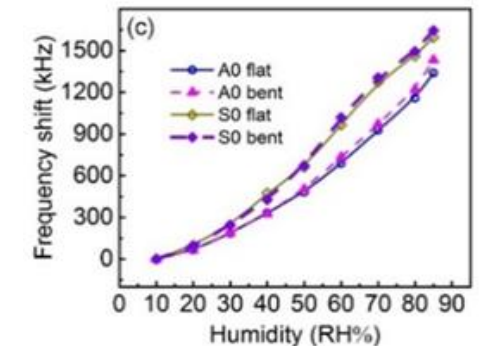
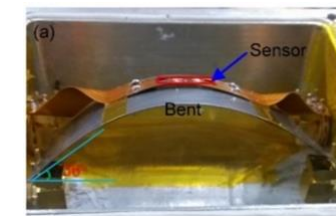
**High sensitivity temp., UV, strain sensors  
—wearable applications**



**Passive wireless high-T SAW sensors**



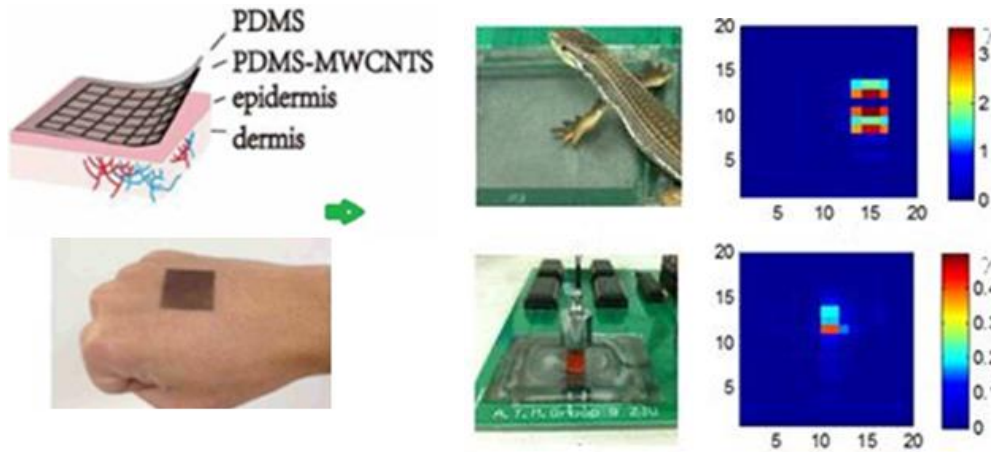
**Humidity sensing**



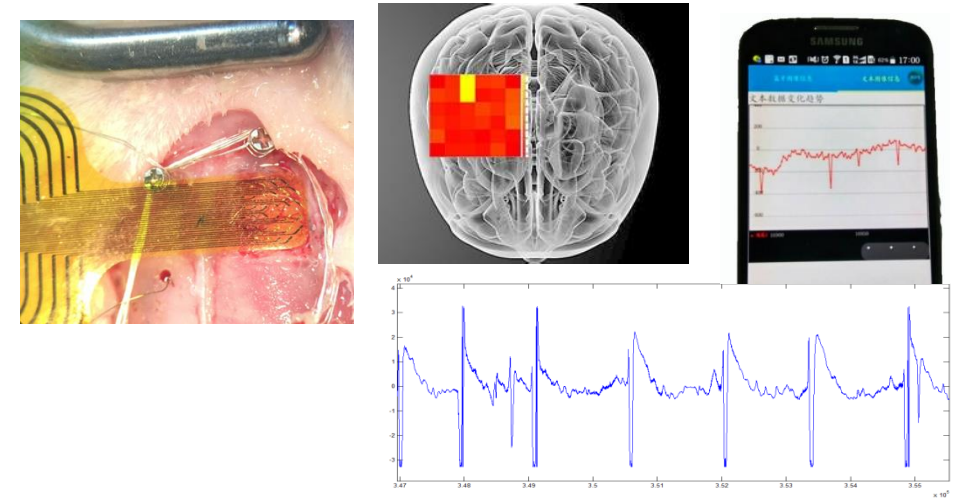


# Flexible/Dissolvable Electronics for Biomedicine

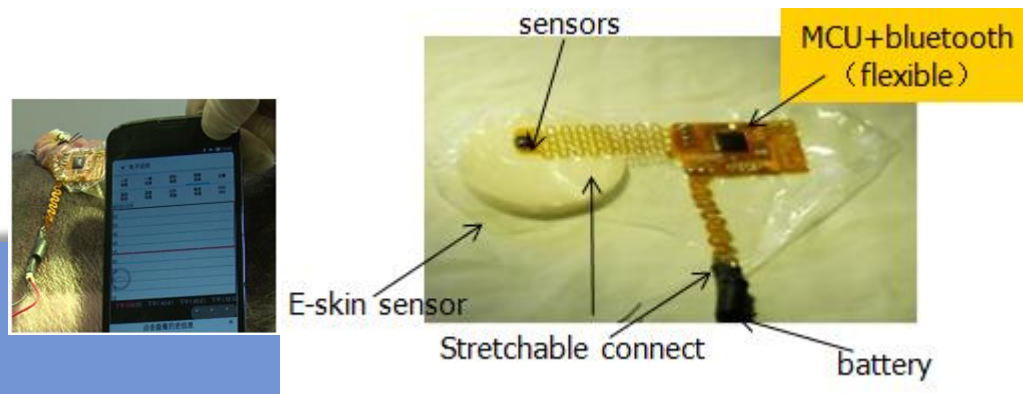
## Electronic-skin sensors



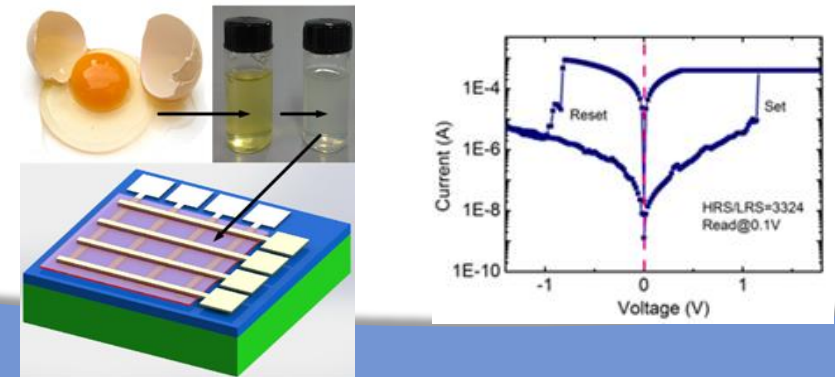
## Portable brain-phone epilepsy detector



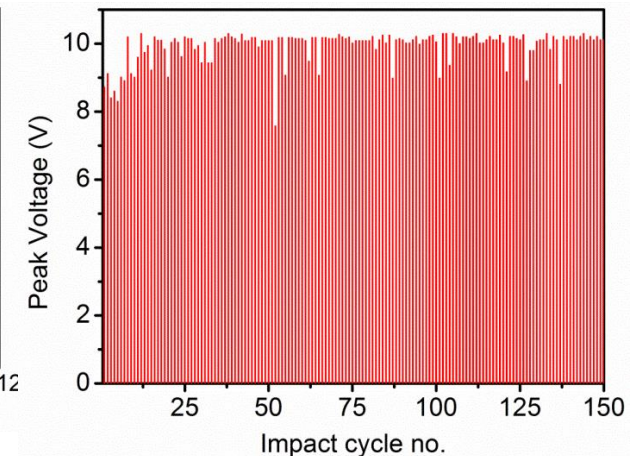
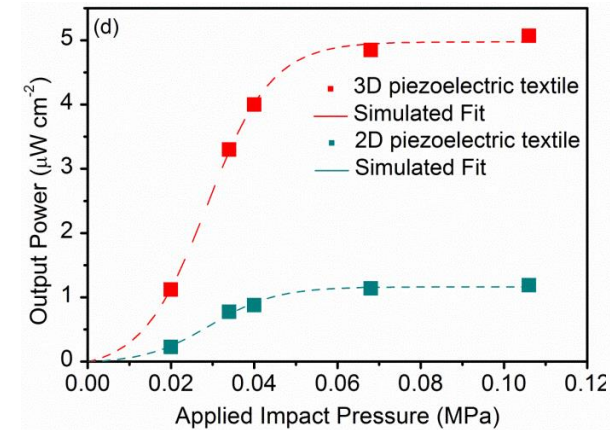
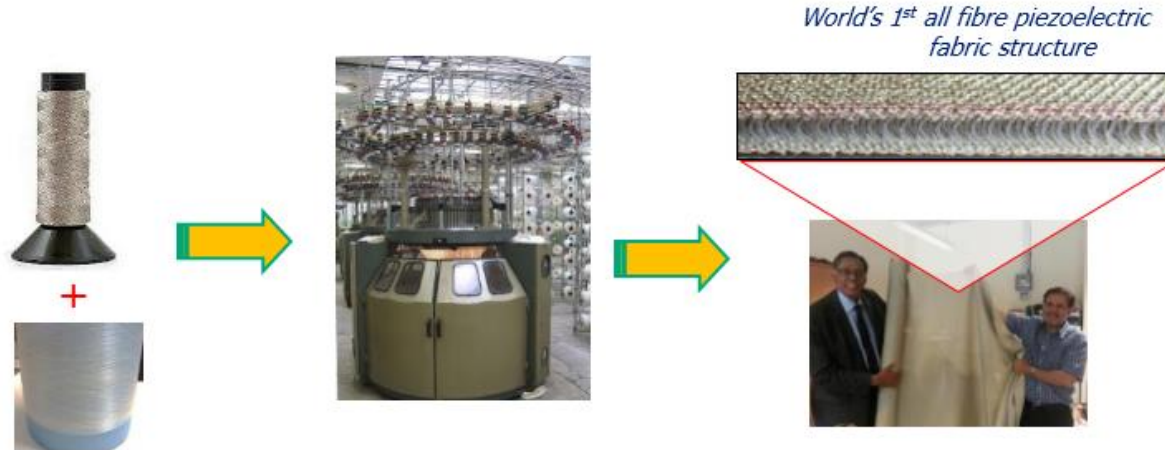
## Mobile phone based wound monitoring



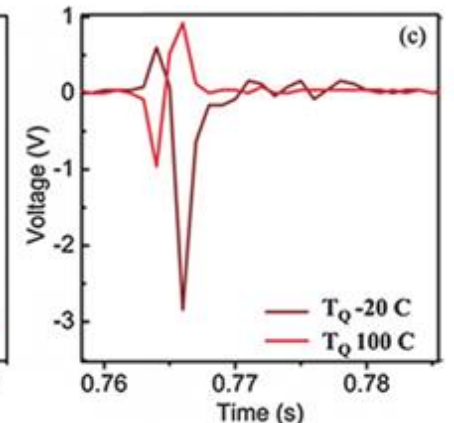
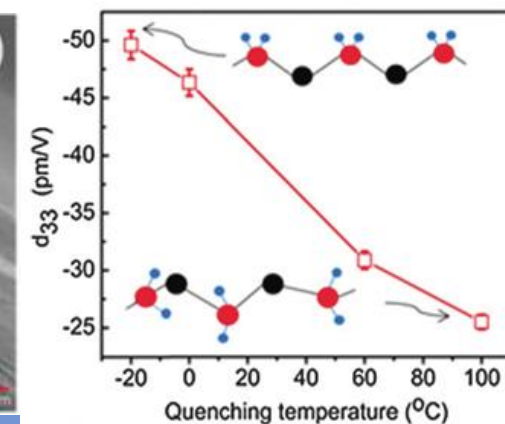
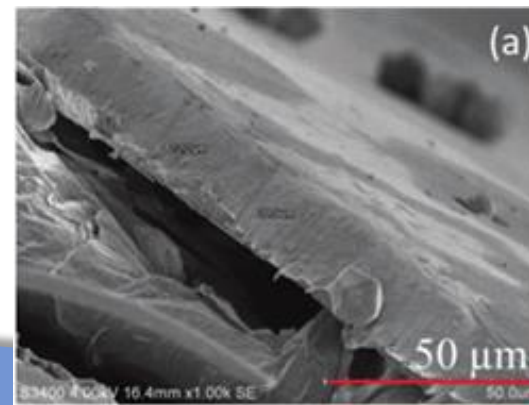
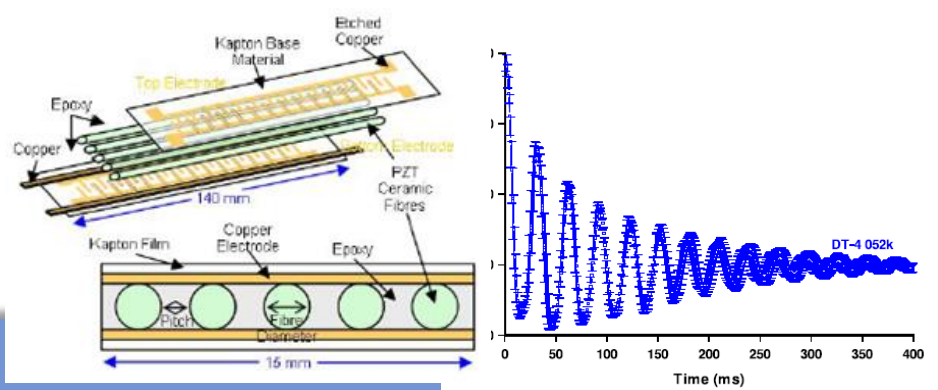
## Dissolvable electronics



# Piezoelectric polymer based generators



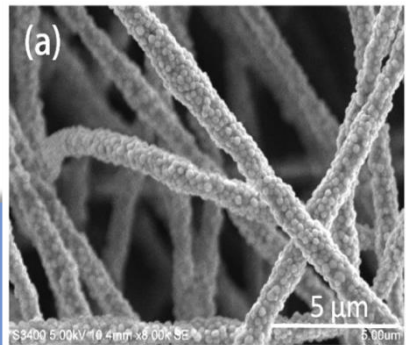
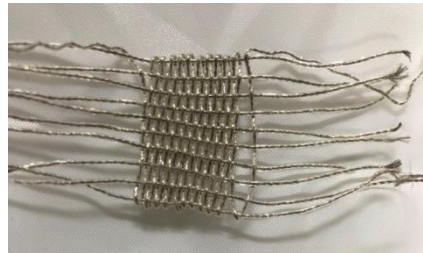
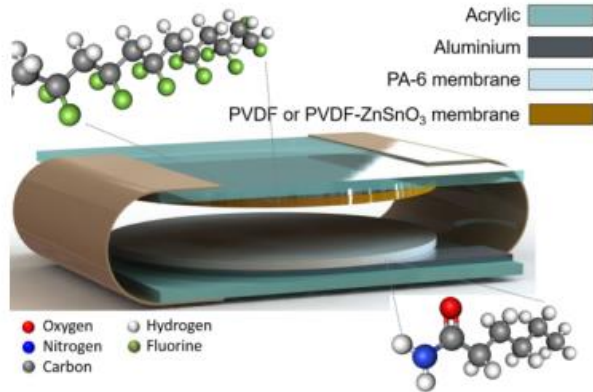
Exclusive self-aligned  $\beta$ -phase PVDF films have  $d_{33} \sim 50 \text{ pm/V}$



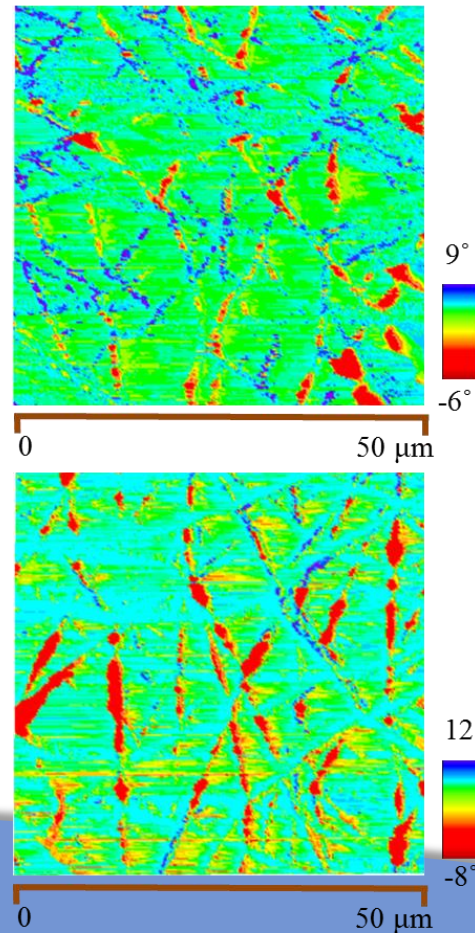


# Micro-energy sources

## Triboelectric generators

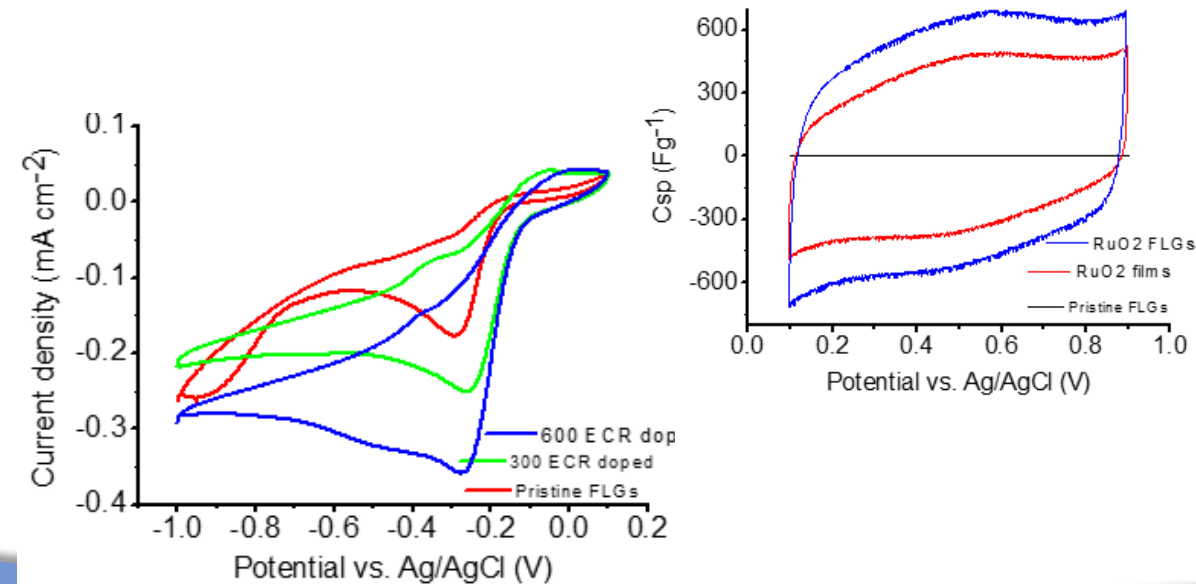


EFM Phase



Material synthesis;  
 Structures optimization/modelling;  
 Electronics for storage/application;  
 Self-powered sensors.

## Fuel Cells, Supercapacitors

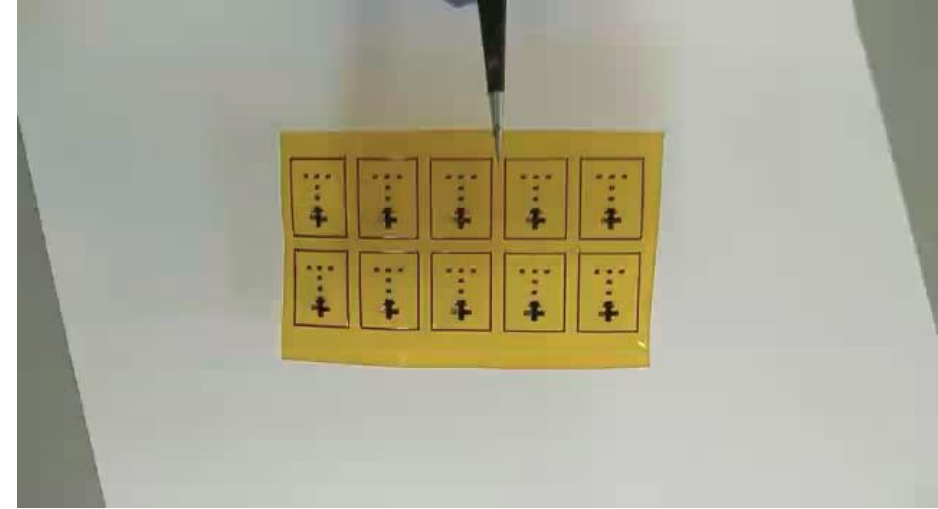


# Antenna design & wireless sensor networks

## Drainage infrastructure monitoring



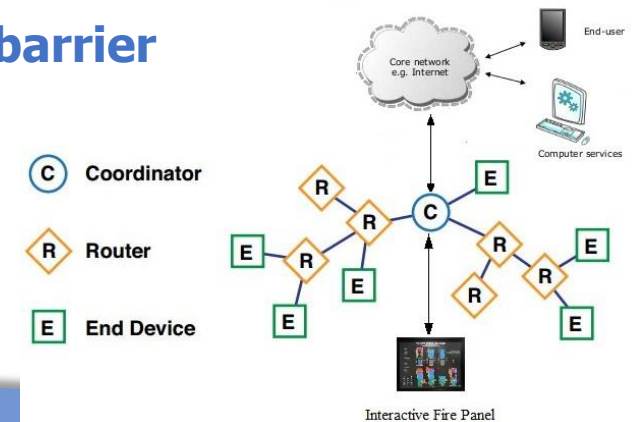
## Laser printed 5G antennas



## Traffic control

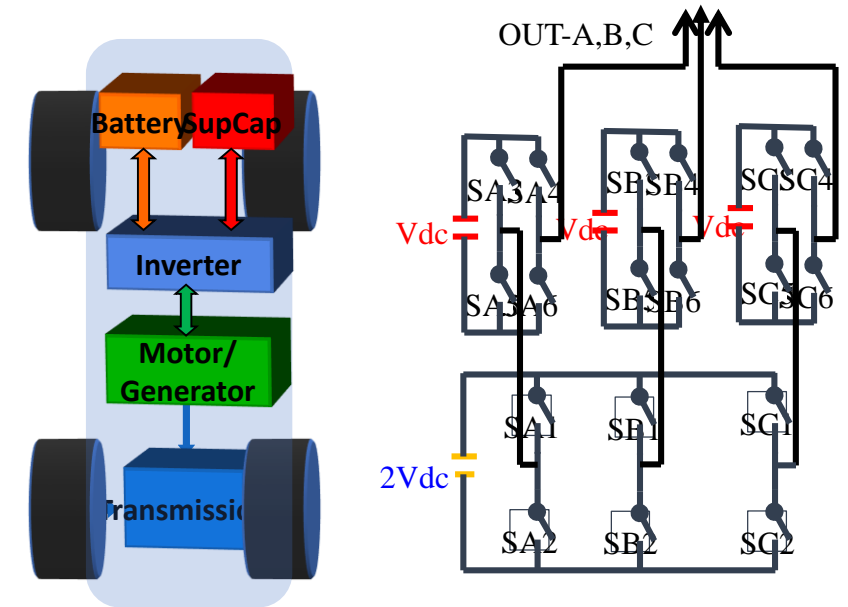
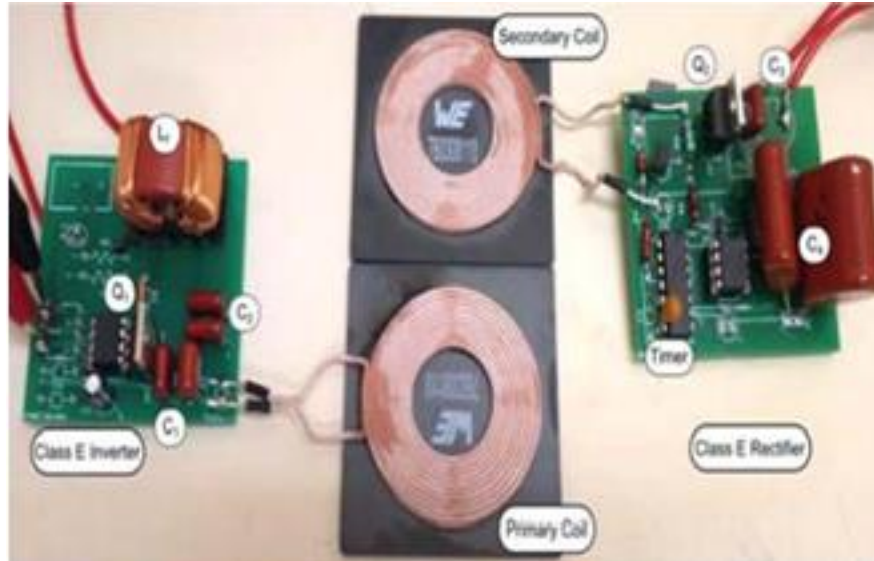


## WSN for fire protection barrier



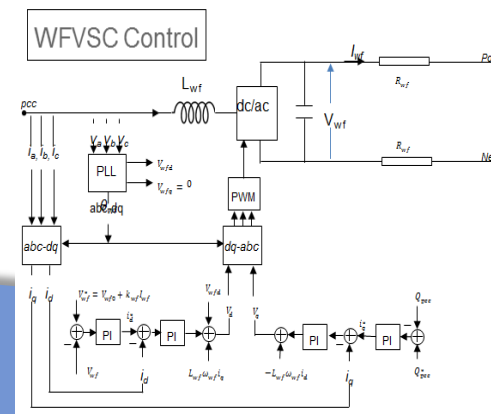
# Wireless power transfer/power electronics

## Wireless power transfer: 1-100W



For vehicle power regulation

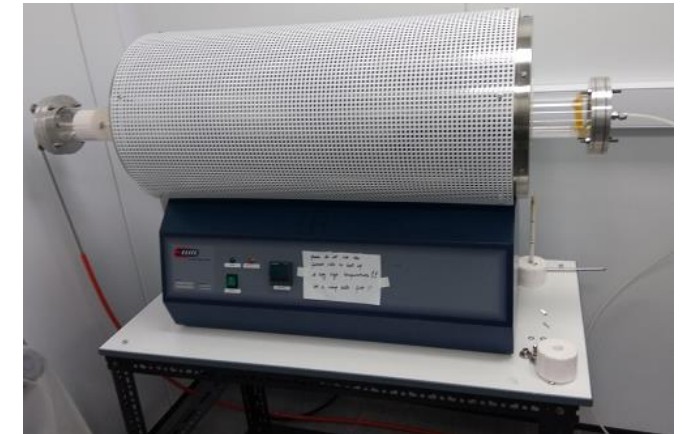
## For wind turbines power generators





# Facilities & Equipment

- *Class 1000 cleanroom*
- *Thin film process equipment:*
  - ALD
  - Rf, DC Plasma Sputtering
  - E-beam evaporator
  - Thermal furnace
  - Wet bench
- *Electrical test lab:*
  - IV, CV, Hall meas.,
  - Probe station,
  - UV Vis.,
  - Solar cell meas.
  - SEMs, AFM



# Research Collaborators

## *National collaborators:*

*Universities of Cambridge, Warwick, Birmingham, Newcastle, West Scotland, Bradford, Sheffield, Chester, Imperial College*

## *International collaborators:*

*Virginia Commonwealth University, USA*

*Zhejiang University (China)*

*Shanghai 2<sup>nd</sup> Polytech University (China)*

*University of Alberta (Canada)*

*University of South Africa*

*IIT Mumbai (India)*



# *The Offering for 2018/2019*

- *£9250 fee per student with free accommodation in the University Halls, subject to availability.*
- *£7500 per student, with students paying for their own accommodation. The University will assist students to find private accommodation in Bolton.*
- *Summer School £1000/student. Date to be mutually agreed.*
- *Typically private accommodation in Bolton is £50 to £90 per week per student.*

# *School of Engineering University of Bolton UK*

*Brian Klaveness*

MSc BA MIET MIEEEE MInstP

Lecturer Elec/Electronic



School of  
Engineering

# About Me

- *30 Years experience in HE and FE Teaching Electronics and Maths*
- *20 Years recruiting in Germany, Spain and France*
- *Ten years running Summer Schools*
- *Seven years managing top-up Summer Schools for Engineering*
- *Teaching in; Russia, Malaysia, Germany, Nigeria, France and Wales*

## Der heiße Tipp

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Technikerschule kooperiert mit dem North-East-Institute of Higher Education:

# Turbo-Studium zum Bachelor of Engineering – Abschluss nach einem Jahr

**Braunschweig.** Die Technikerschule der Stadt Braunschweig hat kürzlich mit dem North-East-Institute of Higher Education, Wrexham/Wales, ein Memorandum über enge Zusammenarbeit abgeschlossen.

Kern der Kooperation ist die volle Anrechnung der Technikerausbildung auf ein technisches Studium an der Universität Wrexham.

Absolventen der Technikerschule können dadurch innerhalb eines Jahres an der Uni Wrexham den akademischen Abschluss „Bachelor of Engineering“ in den Fachrichtungen Elektrotechnik oder Maschinentechnik erwerben. Dazu der Schulleiter der Technikerschule, Jürgen Voss: „Dieses weiterführende Bildungsangebot verknüpft ideal berufliche Aus- und Weiterbildung mit einer akademischen Qualifikation. In Summe werden für den Techniker- und Bachelor-Abschluss nur drei Jahre benötigt, das sind zweieinhalb Jahre weniger als man in Deutschland dafür benötigte. Außerdem erwirbt man vertiefte

wonach die Anerkennung erworbener Kenntnisse, Fertigkeiten und Kompetenzen zwischen Schul-, Berufsbildungs- und dem Kooperationsprojekt universitären Hochschulsystemen zukünftig mittelbar aufgriffen und umgesetzt werden kann, wird mit EU-weit möglich sein soll, wird mit gesetzt.



Bei der Vertragsunterzeichnung (stehend v. l.): Rüdiger Weihe (Technikerschule der Stadt Braunschweig TSB), Wendy Klaveness, Klaus Dieter Arndt (TSB); sitzend v. l.: Thomas Schebesta (Fachbereich Schule und Sport), Jürgen Voss (Schulleiter Technikerschule), Brian Klaveness (NEWI) und Norbert Heucke (Landesschulbehörde).



Teaching Intensive, Research Informed

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