Micro-fabricated functional surfaces for future engineering

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About us

Where are we?

What we do?

People

**Prof. Glen McHale**
Professor of Applied & Materials Physics

**Dr. Gary G. Wells**
Anniversary Research Fellow in Physics

**Dr. Rodrigo Ledesma-Aguilar**
Senior Lecturer in Physics

**Dr. Ben B. Xu**
Senior Lecturer in Mechanical & Construction Engineering

**Dr. Yifan Li**
Senior Lecturer in Mechanical & Construction Engineering

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Group Profile

EPSRC funding (as in 2015)

- **EPSRC EP/L026899/1**, Lubricating channel and tube flows - Fluid sheathing using textured walls, Amount: **£528k within a £938k programme (100% fEC value)**, Duration: 2014 – 2018. (*Glen McHale and Ben Xu*)
- **EPSRC EP/K014803/1**, Dielectrowetting: Controlling oleo- and hydrohilicity and shaping liquid surfaces, Amount: **£350k within a £450k programme (100% fEC value)**, Duration: 2013 - 2016. (*Glen McHale*)

Selected Paper publication (2014-15)


Y Liu, Y. Li, A El-Hady, C Zhao, JF Du, Y Liu, YQ Fu. Flexible and bendable acoustofluidics based on ZnO film coated aluminium foil, *Sensors and Actuators B: Chemical*, 2015, 221, 230-235
Micro-fabricated Functional Surfaces

Lithography enabled micro and nano fabrication:

• Surface/bulk Etching
• Thin film Deposition
• Self-assembly

Functional Smart surfaces:

• Scalable and integratable
• Can be mass-produced
• Popular for MEMS/NEMS applications

Electro-responsive
Mechano-responsive
Thermo-responsive
Magneto-responsive

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Micro-fabricated Functional Surfaces

Textured Surfaces

Granular Surfaces: Liquid Marbles

Oil infused Textured surfaces

Dielectrowetting and Superspreading

Electrowetting Surfaces

Stimuli-responsive Surfaces for advanced engineering

Engineering of Complex micro-system

Scalable fabrication

Smart materials

Mechanics analysis and FEA simulation

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Future Engineering Applications

Sublimation Heat Engine: Leidenfrost Effect on patterned surface

Drag Reducing Surfaces

SLIP Surfaces

Patterned surface for small volume to area ratio Lab-on-Chip

Sublimation Heat Engine: Leidonfrost Effect on patterned surface

Soft lithography for Flexible/Stretchable sensors & actuators

Liquid Optics

Folding surfaces: Capillary Origami

Swimming robots: Air bubble driven by Electrical Field

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Lab Facilities

Fabrication of Materials/Surfaces
• Wet Chemistry synthesis kit in Nanotechnology standard
• Electrospinning set
• Rapid Prototyping Suite: 3D printing (various systems),
• Laser cutting,
• PCBs via milling
• Spin Coating: Elastomer surfaces
• Lithography: Mask aligner, assorted deposition, CAD

Characterisations
• Contact Profilometry
• Scanning Electron Microscope
• Krüss Drop Shape Analysis: Contact angles
• Optical Microscopy system: fluorescence, 3D surface profile, polarizing, micro-flow imaging,
• High Voltage Amplifier + Signal Sources:
• Quartz Crystal Microbalance (QCM): Surface attachment/coating experiments
• Potentiostat for electro-chemical testing

High Speed Cameras
Network Analyzer,
Contact Details

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