Research groups

Research in Synthetic Biology at the University of Birmingham fits into the following groups. Click on the group title to see the researchers.

Open all sections

Bionanotechnology

Dr Kenton Arkill

Dr Kenton Arkill is a biophysicist and microscopist based in Physics and Astronomy researching microfluidics and permeability of the microcirculation.

Dr Mark Cobbold (http://uk.linkedin.com/in/cobbold)

Dr Mark Cobbold is an immunologist with an interest in engineering biological molecules that could specifically target malignant cells.

Selected publications from Dr Cobbold (/research/activity/synthetic-biology/publications/index.aspx#cobbold)

Dr Liam Cox (http://www.birmingham.ac.uk/schools/chemistry/people/navigation.aspx?ReferenceId=8962&Name=dr-liam-cox)

Dr Liam Cox's research focuses on glycolipids and their role in CD1d-mediated immunity. In the area of synthetic biology we looking to develop methods for generating CD1d–glycolipid conjugates either through protein modification or by incorporating homologation 'tags' into our glycolipid substrates. We are also fabricating model cell membranes for probing how the incorporation of CD1d agonists modifies membrane behaviour.

Selected publications from Dr Cox (/research/activity/synthetic-biology/publications/index.aspx#coxl)

Professor Tim Dafforn (http://www.birmingham.ac.uk/staff/profiles/biosciences/dafforn-tim.aspx)

Tim Dafforn develops novel detection systems based on the behaviour of spaghetti-like viruses in flow.

Selected publications from Professor Dafforn (/research/activity/synthetic-biology/publications/index.aspx#dafforn)

In the video below, Professor Dafforn describes his research in 60 seconds.

Adobe Flash Player or QuickTime is required for video playback. Get the latest Flash Player Get the latest version of QuickTime

Video transcript here (/university/colleges/les/research-gallery/tim-dafforn.aspx)

Dr Francisco Fernández-Trillo (http://www.birmingham.ac.uk/staff/profiles/chemistry/fernandez-trillo-francisco.aspx)

Dr Fernandez-Trillo work on the novel polymeric materials that can find applications at the Chemistry Biology-Interface. His research has found application in Biocatalysis, Magnetic Resonance Imaging, Sensing, and Synthetic Biology.

Selected publications from Dr Fernandez-Trillo (/research/activity/synthetic-biology/publications/index.aspx#trillo)

Professor Liam Grover (http://www.birmingham.ac.uk/staff/profiles/chemical-engineering/grover-liam.aspx)

Liam Grover studies the interactions that occur between materials and biological system. An improved understanding of these interactions have allowed him to develop novel therapies for tissue regeneration. He has developed systems that enable the growth of tissues outside the body and is exploring clinical translation of these technologies.

Selected publications from Professor Grover (/research/activity/synthetic-biology/publications/index.aspx#grover)

Dr Sara Jabbari (http://www.birmingham.ac.uk/staff/profiles/maths/jabbari-sara.aspx)

Dr Sara Jabbari models gene regulation networks using mathematics to examine the effects of altering aspects of these networks.

Selected publications from Dr Jabbari (/research/activity/synthetic-biology/publications/index.aspx#jabbari)

Professor Roy Johnston (http://www.tc.bham.ac.uk/~roy/)

Mapping and visualising the potential and free energy landscapes of model proteins (e.g. using off-lattice bead models) and cyclic peptides (AMBER force field modelling). Global optimisation (finding lowest energy structures). Calculation of circular dichroism spectra of cyclic peptides and comparison with experimental data (e.g. NMR studies of Dr Anna Peacock).

Selected publications from Professor Johnston (/research/activity/synthetic-biology/publications/index.aspx#johnston)

Dr Anne-Marie Krachler (http://www.birmingham.ac.uk/schools/biosciences/staff/profile.aspx?ReferenceId=33241&Name=dr-anne-marie-krachler)

Dr Krachler's group develops anti-virulence strategies to counteract multidrug resistant bacterial infections. The focus right now is on engineering adhesion inhibitors that competitively inhibit pathogen binding and tissue colonization.

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Dr Paula Mendes (http://www.birmingham.ac.uk/mendes)

Dr Paula Mendes research interests lie in the development of surface materials with stimuli-responsive and novel biofunctional properties.

Selected publications from Dr Mendes (/research/activity/synthetic-biology/publications/index.aspx#mendes)

Dr Anna Peacock (http://www.birmingham.ac.uk/staff/profiles/chemistry/peacock-anna.aspx)

Dr Anna Peacock researches the *de novo* design of coiled coils and miniature protein architectures. In particular her group focus on the design of metallopeptides.

Selected publications from Dr Peacock (/research/activity/synthetic-biology/publications/index.aspx#peacock)

Dr Zoe Pikramenou (http://www.birmingham.ac.uk/staff/profiles/chemistry/pikramenou-zoe.aspx)

Dr Pikramenou 's research group studies the development of luminescent nanoprobes and their interaction with biomolecules to monitor cellular events.

Selected publications from Dr Pikramenou (/research/activity/synthetic-biology/publications/index.aspx#pikramenou)

Professor Jon Preece (http://www.nanochem.bham.ac.uk/)

Professor Preece is interested in the design, synthesis and characterisation of; novel peptides for delivery of DNA/RNA for application in gene delivery; biocompatible surfaces for sensing biological important analytes; and the analysis on nanoparticles when interacting with biological samples.

Selected publications from Professor Preece (/research/activity/synthetic-biology/publications/index.aspx#preece)

Professor James Tucker (http://www.birmingham.ac.uk/staff/profiles/chemistry/tucker-james.aspx)

Professor Jim Tucker works on the design and study of modified nucleic acids, in particular those containing metal-based and luminescent sub-units.

Selected publications from Professor Tucker (/research/activity/synthetic-biology/publications/index.aspx#tucker)

Dr Peter Winn (http://www.birmingham.ac.uk/staff/profiles/biosciences/winn-peter.aspx)

Peter Winn's group develops and applies computational techniques for the analysis and re-engineering of protein function and protein interactions.

Selected publications from Dr Winn (/research/activity/synthetic-biology/publications/index.aspx#winn)

Genes and genetic control

Professor Steve Busby (http://www.birmingham.ac.uk/staff/profiles/biosciences/busby-steve.aspx)

Steve Busby works on the organisation of bacterial promoters and how they integrate multiple signals to control gene expression. They have discovered several different mechanisms for integration and these can be exploited to design new to nature genetic switches.

Selected publications from Professor Busby (/research/activity/synthetic-biology/publications/index.aspx#busby)

Professor Jeff Cole (http://www.birmingham.ac.uk/staff/profiles/biosciences/cole-jeff.aspx)

Our laboratory has worked with 7 companies or their subsidiaries producing novel recombinant proteins in the last five years. Two are current KTP projects, with COBRABIO and TouchLightGenetics. The aim of the latter project is to develop a completely synthetic biochemical methods for the production of novel DNA vaccines that do not contain immunogenic sequences or even plasmid DNA sequences. These products will be completely free of bacterial contaminants because they are made using purified enzymes and nucleotides.

Selected publications from Professor Cole (/research/activity/synthetic-biology/publications/index.aspx#cole)

Dr Rosemary Dyson (http://www.birmingham.ac.uk/schools/mathematics/people/navigation.aspx?ReferenceId=9869&Name=dr-rosemary-dyson)

Dr Rosemary Dyson is a Lecturer in Applied Mathematics focussing on biological modelling. She applies the principles of mathematical modelling to mechanical problems in biological contexts, generating novel insights into the systems involved, as well as new mathematical techniques.

Selected publications from Dr Dyson (/research/activity/synthetic-biology/publications/index.aspx#dyson)

Dr Jan-Ulrich Kreft (http://www.biosciences-labs.bham.ac.uk/kreftlab/)

The Kreft lab is focussed on developing agent-based models of microorganisms interacting with each other and various environments. Interactions of interest include metabolic cooperation, quorum sensing, and antibiotic resistance plasmid transfer. Microbes simulated can be hypothetical or simplified natural. Much is learnt from competing different agents in simpler (chemostat) and more complex (biofilm) environments. Synthetic organisms offer the opportunity for experimentally testing the models in a more rigorous way.

Selected publications from Dr Kreft (/research/activity/synthetic-biology/publications/index.aspx#kreft)

Dr Peter Lund (http://www.birmingham.ac.uk/schools/biosciences/staff/profile.aspx?ReferenceId=9661&Name=dr-pete-lund)

My group is interested organismal responses to stress. We use a wide range of methods from biophysics to systems biology approaches to understand how organisms detect external signals, how this leads to activation of the relevant gene regulatory circuits, and the nature of the responses that help organisms adapt to and survive the stresses. We also use this approach to engineer organisms that have desirable properties such as improved ability to fold proteins.

Selected publications from Dr Lund (/research/activity/synthetic-biology/publications/index.aspx#lund)

Dr Dave Smith (http://web.mat.bham.ac.uk/D.Smith/)

Dr Dave Smith researches micro and nano scale flows associated with bacteria, motile cells, biological structures and biological fluids, in particular the behaviour of the synthetic biology fibre M13 bacteriophage in linear dichroism spectroscopy. Dave also researches the application of machine learning methods to spectra of metabolites and other biomarkers; these techniques are potentially relevant to synthetic biology production processes.

Selected publications from Dr Smith (/research/activity/synthetic-biology/publications/index.aspx#smith)

Professor Christopher Thomas (http://www.birmingham.ac.uk/schools/biosciences/staff/profile.aspx?ReferenceId=9733&Name=professor-chris-thomas)

Professor Chris Thomas works on plasmids and polyketide/non-ribosomal peptide synthetase pathways in bacteria. He is using synthetic biology to build new plasmids to tackle antibiotic resistance and to build new biosynthetic pathways to create new antibiotics.

Selected publications from Professor Thomas (/research/activity/synthetic-biology/publications/index.aspx#thomas)

In the video below, Professor Thomas describes his research in 60 seconds.

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Video transcript here (/university/colleges/les/research-gallery/chris-thomas.aspx)

Metabolic engineering

Professor Jeff Cole (http://www.birmingham.ac.uk/staff/profiles/biosciences/cole-jeff.aspx)

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Selected publications from Professor Cole (/research/activity/synthetic-biology/publications/index.aspx#cole)

Dr Philip Cox (http://www.birmingham.ac.uk/staff/profiles/chemical-engineering/cox-philip.aspx)

Looking for active molecules in unlikely places. Food waste is an exceptionally rich resource for looking for bio-active molecules. The Cox Group are looking at ways of identifying, extracting and exploiting these molecules.

Selected publications from Dr Cox (/research/activity/synthetic-biology/publications/index.aspx#coxp)

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Selected publications from Dr Kreft (/research/activity/synthetic-biology/publications/index.aspx#kreft)

Professor Lynne Macaskie (http://www.birmingham.ac.uk/staff/profiles/biosciences/macaskie-lynne.aspx)

Professor Lynne Macaskie harnesses microbial enzymes and structures to make structured nanocatalysts for green chemistry and energy applications and nanomaterials for decontamination of radioactive wastes. She also bioconverts wastes and sunlight into biofuel by combining microbial activities with photonics.

Selected publications from Professor Macaskie (/research/activity/synthetic-biology/publications/index.aspx#macaskie)

Dr Tim Overton (http://www.birmingham.ac.uk/overton)

Dr Tim Overton is an applied molecular microbiologist who harnesses bacteria to generate useful compounds including recombinant protein drugs and pharmaceutical precursors. He does this by both engineering individual bacteria and incorporating these bacteria into engineered biofilm catalysts. He is also interested in the analysis of bacteria and yeast on the

single cell level using flow cytometry.

Selected publications from Dr Overton (/research/activity/synthetic-biology/publications/index.aspx#overton)

Professor Mark Simmons (http://www.birmingham.ac.uk/staff/profiles/chemical-engineering/simmons-mark.aspx)

Mark Simmons is exploiting the use of engineered biofilms as biocatalysts for production of pharmaceutical intermediates and to prevent infection in biomedical applications. He also collaborates with Tim Dafforn on the use of bacteriophage as flow markers in biochemical and biomedical processes.

Selected publications from Professor Simmons (/research/activity/synthetic-biology/publications/index.aspx#simmons)

Professor Christopher Thomas (http://www.birmingham.ac.uk/schools/biosciences/staff/profile.aspx?ReferenceId=9733&Name=professor-chris-thomas)

Professor Chris Thomas works on plasmids and polyketide/non-ribosomal peptide synthetase pathways in bacteria. He is using synthetic biology to build new plasmids to tackle antibiotic resistance and to build new biosynthetic pathways to create new antibiotics.

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Responsible innovation

Professor Heather Draper (http://www.birmingham.ac.uk/staff/profiles/haps/PrimaryCareClinicalSciences/draper-heather.aspx)

Heather Draper specialises in combining ethical analysis with stakeholder feedback to produce policy friendly ethical commentary on issues in bioethics.

Selected publications from Professor Draper (/research/activity/synthetic-biology/publications/index.aspx#draper)

Professor Mark Viant (http://www.birmingham.ac.uk/staff/profiles/biosciences/viant-mark.aspx)

Professor Kevin Chipman (http://www.birmingham.ac.uk/staff/profiles/biosciences/chipman-kevin.aspx)

Professor John Colbourne (http://www.birmingham.ac.uk/staff/profiles/biosciences/colbourne-john.aspx)

Professors Kevin Chipman, John Colbourne and Mark Viant are pioneering the application of integrated 'omics technologies (from genomics through to metabolomics) to assess the potential toxicity and health risks of engineered nanomaterials, with the ultimate aim to neither under- or over-regulate novel materials and thereby facilitate responsible innovation.

In the video below, Professor Mark Viant describes his research in 60 seconds.

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Video transcript here (/university/colleges/les/research-gallery/mark-viant.aspx)

Dr Sheelagh McGuinness (http://www.birmingham.ac.uk/staff/profiles/law/mcguinness-sheelagh.aspx)

Dr Sheelagh McGuinness researches the interplay between law and ethics as applied to the regulation of health, science, and technology.

Professor Heather Widdows (http://www.birmingham.ac.uk/staff/profiles/philosophy/widdows-heather.aspx)

Heather Widdows is an established applied ethicist. She works on issues of ethics and governance, and has a particular and long standing interest in new technologies which impact upon questions of what it means to be human. Synthetic Biology, is the latest of this list with previous interests being in reproductive technologies and genetics.