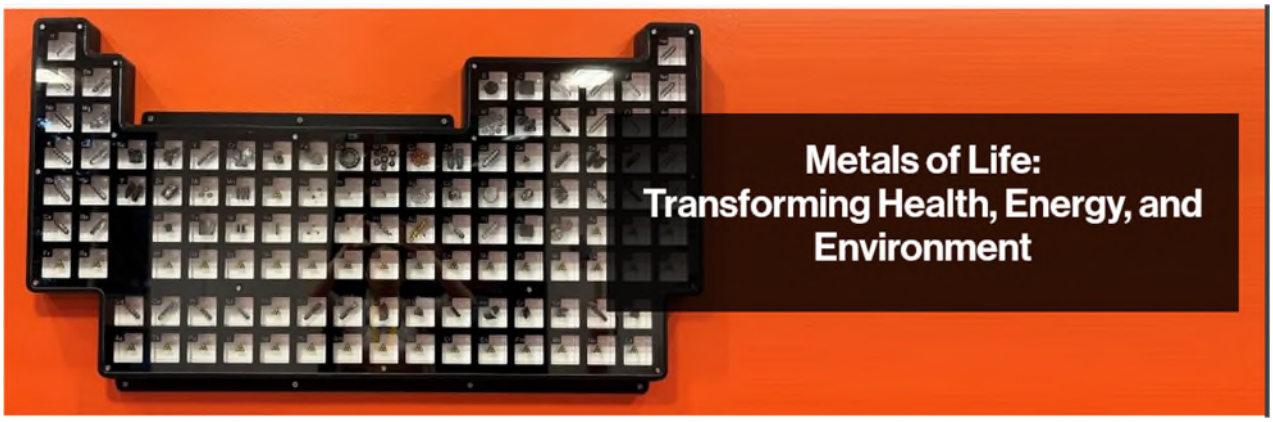


University of Warwick, July 5th – 7th 2026

Book of Abstracts

Welcome to Coventry and the University of Warwick!

Symposium venue

The symposium venue is the **University of Warwick** on the Central University Campus, modern architecture clash with post-war brutalist style buildings. The university is located in Coventry, once the heart of UK automobile industry and totally reconstructed after the war.

The Scientific Programme of the International Symposium Metals of Life 2026 will take place in rooms located along the Science Concourse located inside Sciences building (opposite the University library building, 2nd Floor). Scientific sessions, including keynote lectures, oral communications, and parallel sessions, will be hosted in the two conference rooms: L3 on Sunday (5th) and at PLT on Monday and Tuesday (6th and 7th). Dedicated areas within the Science Concourse will host the Industrial/Sponsor Exhibition and poster sessions. Coffee and lunch breaks will be served in adjacent areas equipped with buffet stations, quick-service points, and a sufficient number of tables to accommodate participants.

Getting to Warwick & Car parking

The University of Warwick campus is located on the outskirts of Coventry and is well connected by road and public transport (from rail and bus station you can use 12x or 11 buses lines). Registration will open from 08:30 on Sunday 5th July on the Science Concourse We recommend delegates park in Car Park 15, which is marked on the map. Parking is free of charge, but all vehicles must be registered in advance using the QR code. When registering:

1. Complete your personal details.
2. Select your arrival and departure dates/times
3. Enter the promotional code MQCZW (reduces the parking charge to £0.00)

Social Events

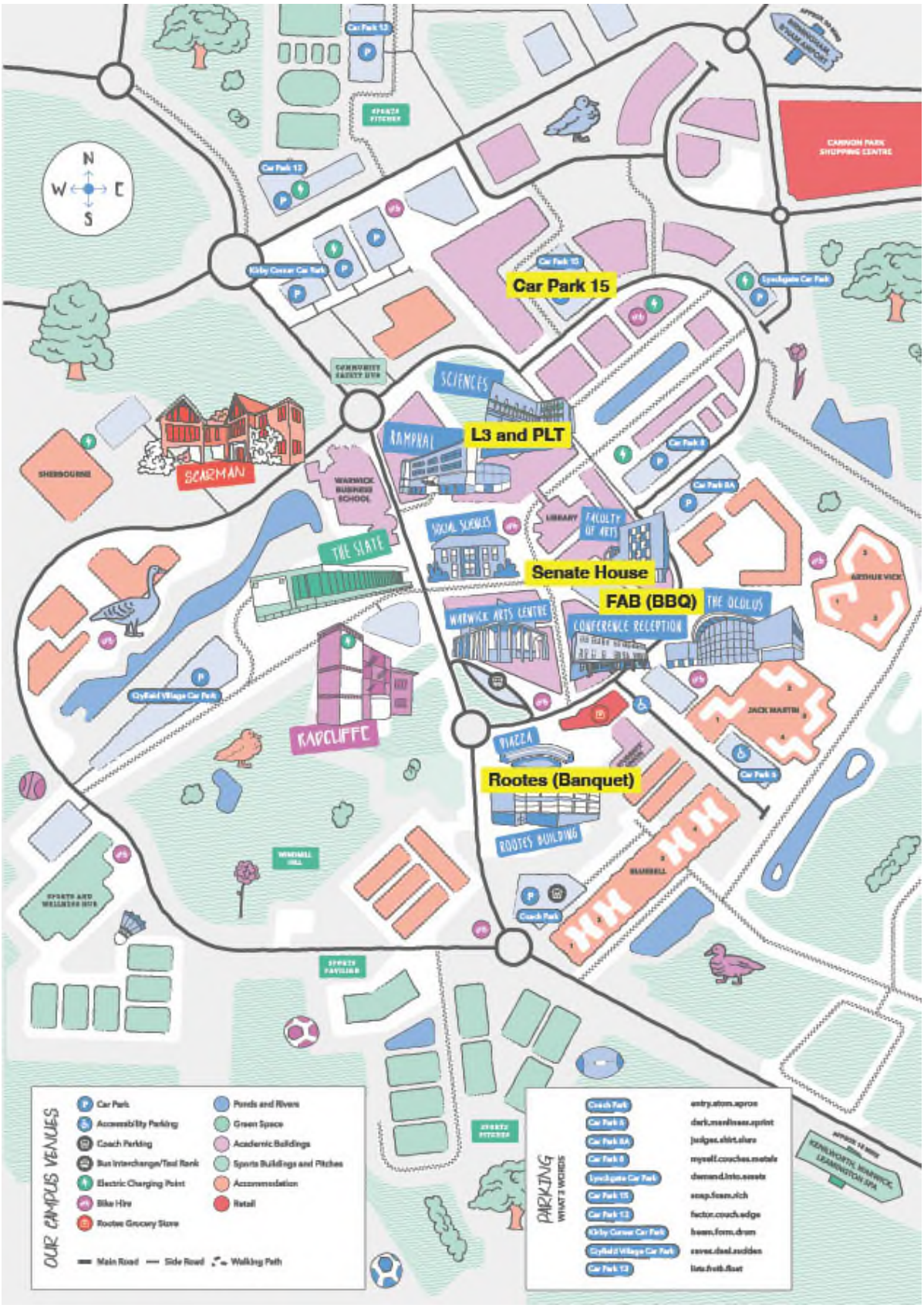
BBQ – Sunday 05/07/2026, 4:30 pm to 7 pm

The Conference BBQ will be held at Faculty of Arts Building (FAB) patio, a venue located in the main campus just few minutes away by foot from the symposium venue. It will be an afternoon dedicated to connecting with old and new friends, celebrate summer, scientific exchange, networking, and international collaboration. The afternoon will offer the opportunity to experience a British summer BBQ (plant-based too) accompanied with good drinks and laughs.

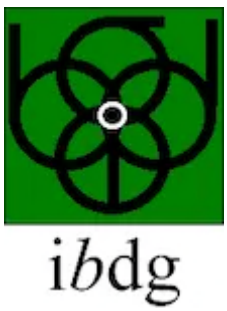
Conference Banquet – Monday 06/07/2026, 6 pm to 9 pm

The Conference Dinner will be held at Chancellor's Room, 2nd Floor, Rootes Building, an exclusive venue located heart of the main campus, just next to Piazza, the main square on central campus. Its distinctive character makes it an ideal setting for a convivial evening dedicated to scientific exchange, networking, and international collaboration. The evening will offer the opportunity to experience a fusion of British and multi-cultural cuisines accompanied with music by the Oakwood Quartet: Morag Clark, Elinor Davies, Maryanne Dowle (clarinets), Keith Bowen (Bass clarinet). A selection of clarinet quartet music including jazz/rag/dance music from the 1920s.

Campus Map


Car Park 15
L3 and PLT
Senate House
FAB (BBQ)
Rootes (Banquet)
SCARMAN
RADCLIFFE
THE SLATE
WARWICK ARTS CENTRE
CONFERENCE RECEPTION
THE OCULUS
ROOTES BUILDING
SCIENCES
RAMPHAL
FACULTY OF ARTS
SOCIAL SCIENCES
WARWICK BUSINESS SCHOOL
SHERBOURNE
PIAZZA
JACK MARTIN
ARTHUR VICK
CANNON PARK SHOPPING CENTRE
OUR CAMPUS VENUES
Car Park
Accessibility Parking
Coach Parking
Bus Interchange/Taxi Rank
Electric Charging Point
Bike Hire
Rootes Grocery Store
Ponds and Rivers
Green Space
Academic Buildings
Sports Buildings and Pitches
Accommodation
Retail
Main Road
Side Road
Walking Path
PARKING
WHAT 3 WORDS

Exhibitors and Sponsors



Abstracts

Talks

Evolving Ocean bugs shaped by the Periodic Table

Rosalind Rickaby

The history of life on Earth leaves an indelible footprint in the changing chemistry of Earth's surface and vice versa. Evolving life repeatedly catalysed its own downfall via the unwitting release of new and initially toxic chemicals. Earth transformed from an oxygen-free planet to an aerobic world by the proliferation of the ancestors of cyanobacteria. This oxygenation dramatically altered the trace element composition of the oceans, leaving a signal in the trace metalloproteome and transporter complement of marine microbes, allowing insight into evolving planetary chemistry.

Metals in medicine

Peter J. Sadler

The elements of the period table offer exciting potential for discovery of novel diagnostic and therapeutic agents with new mechanisms of action. For metal complexes, identification of active pharmacophores and target sites requires determination of structures in biological media, thermodynamics and kinetics of substitution, and redox reactions. I will discuss our recent research on catalytic, photoactivated, radiolabelled, and immunogenic complexes, incorporating genomics and speciomics into an integrated systems pharmacology approach. In-cell speciation of metal complexes and application of AI, present major challenges.

A biomarker-guided approach to precision medicine for platinum

Nicholas Farrell

I will present our work identifying glycosaminoglycans (GAGs) as receptors for cellular internalization of anticancer active platinum compounds, with applications for precision medicine of platinums in cancer. With Professor Sue Berners-Price, we propose that the interactions of glycans and especially sulfated GAGs with coordination compounds has been understudied in comparison to those of proteins and nucleic acids with multiple therapeutic applications.

Copper(II) Picolinamide Compounds with High Selectivity towards Osteosarcoma

Rianne Lord

Picolinamide ligands are versatile and have flexible coordination modes to metal centres and low cytotoxicity in mammalian cell lines. They exhibit promising anticancer activity when complexed to Ir(III), Ru(II)/(III) or Rh(III), or no mammalian cell cytotoxicity, but high antifungal activity when

complexed to Co(II). Due to their tight endogenous control, detoxification, and alternative modes of action, research has focused on the development of metal-based drugs incorporating essential trace elements like Cu(I)/(II). We present a series of Cu(II) picolinamide complexes, which have been fully characterised and their biological activity and modes of action determined against a range of mammalian cell lines. Highlighting strong links between the relative stability and biological activities.

Development of Ru(II)-based Photoantibiotics for Infected Wound Healing

Samya Banerjee

In my lecture, I will discuss the development of Ru(II)-based photoantibiotics in our laboratory to address problems in infected wound healing through antibacterial activities. These photoantibiotics showed excellent photostability, ROS generation, and NADH oxidation upon light exposure (400–700 nm, 10 J cm–2). These photoantibiotics prevented bacterial biofilm formation on medical-grade devices and rapidly repaired infected wounds in Wistar rats. Biocompatibility was validated in the chicken embryonic model and the Wistar rat blood hemolysis model.

From Tetrahedral Gold Curios to Gold-Based Drug Design

Sue Berners-Price

The application of gold in medicine is traceable for several thousand years. In this lecture I will pay tribute to Professor Peter Sadler by describing the transition that occurred from serendipity to gold-based drug design over the course of my research career which began in his group. The early discovery of the antitumour activity of [Au(dppe)2]Cl, came before the emergence of a variety of thiol and selenol protein drug targets, whose dysfunction in cells can cause or contribute to a variety of human diseases (e.g. cancer, rheumatoid arthritis, viral and parasitic diseases).

Host- directed metal-based antivirals

Luca Salassa

Host-directed antivirals are a promising strategy for herpes simplex virus (HSV) management. Inspired by reports that imiquimod (IMQ) may help recurrent HSV infections, we synthesized a library of IMQ-based ruthenium complexes with strong antiviral activity. Lead compounds were more potent than IMQ against HSV in primary and transformed cell lines, with lower cytotoxicity. In patient-derived human ectocervical organoids, which recapitulate native epithelium and immune responsiveness, these Ru-IMQ derivatives markedly reduced viral load without disrupting epithelial integrity, outperforming IMQ.

Exploring metals in medicine mechanism of action through CRISPR screens and transcriptomics

Alice Keirle, Kirsty Peralta, Harshitha Naidu, Isolda Romero-Canelon, Ji-Inn Song, Keith Leppard, Lawrence Young, Sascha Ott, Peter J. Sadler, James P. C. Coverdale, Hannah E. Bridgewater

Understanding the mechanisms of action of metallodrugs remains a significant challenge due to the fact they are often multi-targeting. Here, we present two case studies demonstrating the application of molecular biology approaches. A genome-wide CRISPR screen identified genes associated with resistance to FY12 in ovarian cancer cells, revealing involvement of diverse cell death pathways and importance of genes; RPRML, PINLYP, ARRDC4, SYDE2, RFNG and EIF4EBP1. Transcriptomic analysis of JPC129-treated ovarian cancer cells showed activation of autophagy, DNA damage signalling, ROS accumulation and apoptosis. Together, these approaches revealed novel mechanisms underlying metallodrug anticancer activity.

Approved drugs and metal ions. Friends or foes?

Iztok Turel

Many metal ions can react with drugs used in clinical practice and reduce their biological effect. Conversely, it has also been observed that many metal complexes of approved drugs exhibit increased or altered biological activity. A common research strategy in my group is to study the reactions of clinically used drugs with different metal ions. Additionally, the binding of free drugs as ligands to the metal centre in metal-containing biological molecules is also of interest. In my talk, I will present selected example of pyrithione-metal complexes.

Preclinical development of luminescent complexes as antimicrobials

Jim A Thomas

Antimicrobial resistance (AMR) is an urgent global health threat. Yet, a recent WHO annual pipeline report identifies only 90 new therapeutic being developed to target the WHO bacterial priority pathogens list. By contrast, there are over 5,000 anticancer therapeutics in clinical development. In this context, the Thomas group has identified a Ru(II)-based, highly active, broad-spectrum antimicrobial that can clear ESKAPE infections in vivo. Herein, the preclinical develop and first step toward commerialisation of this complex and its derivatives will be described.

G-quadruplex (G4) DNA and RNA structures

Tia E. Keyes

G-quadruplex (G4) DNA and RNA structures are important regulatory elements in genomic stability, transcription, and translation, and are emerging as promising targets for diagnostic and therapeutic

intervention. The development of molecular probes capable of selectively recognizing and reporting on these non-canonical nucleic acid structures in live cells remains a significant challenge, particularly where multimodal imaging and functional readouts are required. In this contribution, I present recent advances from our group in the design and application of metal polypyridyl charge-transfer luminophores as versatile probes for the detection an

Imaging Metal Trafficking: From Bioinorganic Chemistry to Therapeutic Discovery

Cinzia Imberti

Our work combines imaging techniques to investigate the fate of metal ions and metal-based drugs from the cellular to the whole-body level, providing insight into uptake, intracellular trafficking, resistance, and therapeutic response. In this talk, I will discuss how, and to what extent, radionuclide imaging can bridge bioinorganic chemistry and translational medicine, using examples from our research in platinum agents, endogenous metal biology, and copper-lowering drugs.

Novel chemical probes for metal, ROS and protein imaging

Maolin Guo

We develop fluorescent probes to study real-time biological processes in live cells. Using coordination-induced fluorescent activation (CIFA) and redox-based sensing strategies, we created probes for metal ions, oxidative stress, and reactive oxygen species, enabling subcellular imaging and quantification in live cells, including first-time measurements in some cases. These tools have revealed abnormal iron and ROS levels in cancer and neurodegenerative models. More recently, we developed genetically encodable fluorescent amino acids for real-time protein imaging in live cells.

Steps towards the in situ activation of anticancer drugs

Carlos Sanchez Cano

Metal complexes are used as therapeutic drugs. Still, once inside the organism they suffer harsh environmental changes causing degradation and decrease in their therapeutic efficiency, but also unwanted toxicity upon release of non-natural components.

Inorganic Answers to Metastatic Breast Cancer

Thomas V. O'Halloran

After discovering Ru-drugs with Prof. Sadler, Haimei Chen came to NU and invented ways to target As and Pt drugs to tumors. This led to Denana Miodragović's discovery that Pt-As bonds in Arsenoplatins are active against cancers where copper trafficking proteins mediate Pt-resistance. Haimei's metallomic mapping results show metastatic breast cancer cells in culture and patient

tumors cheat by using less Cu, Fe and Zn, supporting therapeutic targeting of inorganic pathways. Breast cancer metastasis thus joins zinc sparks at fertilization as biology that pivots on changes in cellular metallomes.

Is Parkinson's disease a man-made disease?

Kevin Barnham

The incidence of Parkinson's disease (PD) has doubled in the last 20 years and is predicted to double again in the next twenty in what has been described as a PD pandemic. There is no single definitive cause for PD, and the increased incidence cannot be explained by ageing, population growth, or genetics. In an increasingly industrialised world, a mosaic of genetic and environmental risk factors coalesce to initiate disease. How environmental insults contribute to the onset and progression of PD will be discussed

Bioinorganic Computational Chemistry: A Journey

Rob Deeth

A short history describing the introduction, development and application of computational methods for tackling biologically-relevant systems containing transition metals bound to ligands, proteins and bits of double stranded DNA and using them to try and tackle the kinds of knotty problems that Peter Sadler wanted answers to.

Development of advanced mass spectrometry techniques to study new biological challenges.

Christopher A. Wootton

Creative chemistry requires creative analytical solutions to enable study. Mass spectrometry (MS) is an analytical technique known for its ability to analyse complex mixtures but even MS requires development to study the next generation of analytical and biological challenges. Herein we will discuss efforts to move beyond the mass to charge domain and into the spatial and chemical shape domain to tackle upcoming challenges.

Applications of ruthenium and iron complexes in asymmetric hydrogenation and C-N bond formation.

Martin Wills

The application of h5-arene ruthenium diamine complexes in asymmetric transfer hydrogenation will be described, along with their relevance to biological mechanisms. In addition, the synthesis

and applications of cyclopentadienyl iron tricarbonyl complexes and their application to C-N bond formation (via hydrogen borrowing) will be described.

tethered half-sandwich complexes of Ru, Rh, Os and Ir

Ana M Pizarro

Over the past decade, I have explored tethered half-sandwich complexes of Ru, Rh, Os and Ir, in which the leaving group is covalently attached to the molecule. Using these systems, we have asked what chemistry can be mediated by the complexes, and what processes occur at the molecular level inside the cell.
Recently, my group has begun to move further across the periodic table, turning our attention to rhenium, and venturing into first-row territory with cobalt. In this talk, I will present selected results from this recent work, driven by a lasting curiosity to explore the wider transition-metal block that began during those Sadler years.

Coenzyme Targeting Metal-Based Photocatalytic Antitumor Drugs

Huaiyi Huang

Here we show our efforts to form anticancer drugs inside the organism following this approach.

Surprise biological activities of some platinum complexing ligands

Patrick J. Bednarski

Countless biologically active metal complexes have been reported, with great care taken exploring their mechanisms of action. However, much less attention has been paid to characterizing the biological properties of the complexing ligands. While many complexes were designed to bear specific biologically active ligands, most ligands have been assumed to be bystanders and gain activity first when complexed to the metal. This talk will discuss some examples of platinum complexes we developed using ligands that turned out unexpectedly to possess their own interesting activities.

Design and Development of Bioorganometallic Complexes for Anticancer and Antimicrobial Applications

Prinessa Chellan

Our research focuses on incorporating metals into biologically active scaffolds, particularly benzimidazoles and artesunate, to modify and enhance their activity. This presentation highlights our recent advances in the design of bioorganometallic complexes with in vitro anticancer and antimalarial activity, including polymer micelle-based drug delivery systems for Plasmodium falciparum. The findings show that organometallic modification can significantly influence biological activity, stability and reactivity.

Exploration of Novel Anticancer Strategies Using Metal Complexes

Hongke Liu

We proposed an original anticancer strategy of "bioorthogonal catalytic lethality", and this original approach preliminarily addresses key bottlenecks such as severe toxicity, poor tumor selectivity, and insufficient targeting of anticancer drugs. We also developed a "metal–ligand synergistic enhancement" anticancer strategy, which enhanced the anticancer activity of metal complexes by introducing metal precursors and natural product active ligands with distinct subcellular targeting functions, while also improving the targeting and tumor selectivity of the complexes.

Metalloids for Cancer Therapy: Polymeric Boron Delivery in BNCT

Anaïs Pitto-Barry

Boron neutron capture therapy (BNCT) is a recent cancer treatment modality at the interface of metals in life and drug discovery. In my group, we develop boron-containing polymeric systems to overcome key delivery challenges, in order to enable controlled self-assembly, stability, and targeted accumulation. By designing tailored boron-containing polymer architectures, such nanomaterials are expected to enhance cellular uptake and therapeutic efficacy. These systems provide a platform to optimise boron biodistribution and maximise therapeutic selectivity in BNCT.

Nuclear Protein PC4 Selectively Binds to and Mediate Repair of Crosslinked DNA by a Trans-platinum Anticancer Complex.

Fuyi Wang

The nuclear protein positive cofactor PC4 selectively binds to 1,3-trans-PtTz crosslinked DNA, and the downregulation of PC4 promotes the cytotoxicity of trans-PtTz. Furthermore, the Arg86 residue in PC4 dominates the interaction between PC4 and 1,3-trans-PtTz crosslinked DNA, and the mutation of Arg86 to Gly retards the binding of PC4 to 1,3-trans-PtTz crosslinked DNA, enhancing the cytotoxicity of trans-PtTz. Collectively, PC4 binds to 1,3-trans-PtTz crosslinked DNA, consequently triggering the repair of the DNA lesion.

TiO_2-Loaded Tri-Fluid Electrospun Janus Core–Shell Nanofibers for Wound Dressing Applications

Annie Bligh

In this study, we explore a multi-layer strategy to develop versatile wound dressings capable of preventing infection, supporting healing, and enhancing skin regeneration. A composite structure, PCL//PVP@PVP, was created using PCL and PVP polymers. Titanium dioxide and tranexamic acid were incorporated to combine antimicrobial action with hemostatic effects, aiming to reduce infection risk and improve wound management.

Metal-based complexes for sonodynamic therapy

Pingyu Zhang

Sonodynamic therapy (SDT) is a new non-invasive treatment strategy. It uses ultrasound (US) to trigger the sensitizer to produce ROS to kill cancer cells. Compared with light, US shows deeper tissue permeability, which has great advantages in the treatment of deep tumours. The exploration of metal complexes with US sensitization effect is of significance for the application of metal complexes in SDT. Our group reported for the first time that some metal complexes were used for sonodynamic therapy of tumors, which solved the problem of low light penetration depth of PDT.

Anticancer gold complexes: Controlled activation, precision targeting and beyond

Taotao Zou

This talk will summarize our strategies to address translational barriers of gold anticancer drugs, involving stimulus-responsive gold prodrugs to overcome albumin-mediated off-target binding; a subcellular photocatalysis strategy for selective inhibition of TrxR1; and a dynamic ligand exchange strategy enabling the therapeutic repurposing of the approved drug auranofin at clinically relevant doses for anticancer treatment.

Photoactivated therapy for tumours

Huayun Shi

Photodynamic therapy (PDT) is widely used in clinical cancer treatment but constrained by two intrinsic limitations. First, PDT is highly oxygen dependent, reducing its efficacy in hypoxic tumours. Second, the current visible to near-infrared (NIR) light sources with limited tissue penetration used in the PDT are inadequate to reach deep-seated tumors. We developed corresponding strategy to address these challenges. Oxygen-independent photoactive diazido Pt(IV) prodrugs were developed to overcome hypoxia resistance, while X-ray with unlimited tissue penetration was employed to cure deep tumours.

Activatable Phototheranostics Based on Bioorthogonally Responsive Transition Metal Complexes

Kenneth Kam-Wing Lo

Phototheranostics integrate diagnostic imaging and therapy in a single light addressable platform, enabling minimally invasive intervention with high spatiotemporal control and reduced systemic toxicity. Luminescent transition metal complexes are attractive for their exceptional photophysical and photochemical properties, supporting probes that couple disease detection with targeted treatment. In this presentation, I will highlight our advances in activatable transition metal phototheranostics that combine activity based sensing with bioorthogonal chemistry. By exploiting target reactivity and bioorthogonal ligations or dissociative reactions, we create switchable systems for imaging and controlled photodynamic therapy. We developed luminescent rhenium(I), ruthenium(II), and iridium(III) polypyridine complexes whose emission and reactive oxygen species generation are tuned by enzymatic activity, tumor microenvironments, and bioorthogonal triggers.

Shining a light on the origin of iron species in the human brain

Joanna Collingwood

Iron dysregulation is evident in many forms of disease, including a spectrum of neurodegenerative disorders. To advance our understanding of the role of iron, it is helpful to be able to determine in detail the distribution of iron as it relates to metabolites, proteins, cells, and tissues, the chemical state and local environment of iron, and its relationship with other metal elements. This talk will explore recent progress, from the methods that are enabling label-free measurement of iron in the brain, to the identification of brain cells responsible for iron regulation.

Metal Binding, Fatty Acids, and Insulin Stability: An Integrated Role for Serum Albumin

Alan Stewart

Serum albumin binds transition metals and regulates their circulatory transport. Structures of Zn^{2+} and Cu^{2+}-bound albumins define key sites, including sites A, B and the ATCUN Cu^{2+} site. Plasma fatty acid levels are elevated in type 2 diabetes and allosterically perturb Zn^{2+}–albumin binding. This alters Zn^{2+}speciation in plasma, which can be mapped using metalloproteomics. FRET and single molecule studies show that albumin, fatty acids, and zinc regulate insulin oligomerisation and stability, with implications for glycaemic control.

Brave new world: copper handling by albumin watched through the millisecond window of stopped-flow kinetics

Wojciech Bal

Human serum albumin is a key actor in extracellular copper transport, with its high-affinity ATCUN type N-terminal site (NTS) implicated. However NTS, its peptidic models and other ATCUN complexes exchange Cu2+ slowly, making its physiological role dubious. We used stopped-flow to revisit this issue by examining the Cu2+ acquisition by ATCUN peptides and HSA. We found that all Cu2+-ATCUN complexes are formed via reactive intermediate complexes (IC). The half-life of HSA IC is ~6 s, making is suitable for the blood copper carrier role

Amyloid beta assembly, membranes, metal ions and Alzheimer's Disease.

John H Viles

Small prefibrillar structures of the amyloid-β peptide (Aβ) are central to cytotoxicity in Alzheimer's disease. Using a combination of cryo-electron tomography (cryo-ET) and cryo-EM single particle analysis, 3D nano-scale images of various Aβ assembly types and their interaction with exosomes are described. Cu(II) traps Aβ42 as prefibrillar oligomers causing membrane permeability and unregulated Ca(II) cellular influx.

[1] R Liang,..JH Viles (2025) Science Advances

[2] Y Tian,..JH Viles (2024) JACS Au

[3] JH Viles (2023) Angewandte Chemie

Secondary ion mass spectrometry - confocal laser scan microscopy multi-modal single cell imaging

Yao Zhao

The interaction of drugs with molecular targets in cells is key to their activity but still difficult to study in situ. We developed a new secondary ion mass spectrometry (SIMS) - confocal laser scan microscope (CLSM) multi-modal imaging technology. This method can in situ study the interaction between platinum drugs and target proteins in single cells. For example, we observed that HMGB1 protein has high affinity towards Pt-damaged DNA. Moreover, the activity of Smad3 protein was significantly inhibited when DNA is damage by cisplatin.

Flash Talks

Relativistic DFT-NMR calculations in organometallic systems.

Giacomo Saielli

In a typical NMR experiment, the chemical shifts and the spin-spin coupling constants contain a plethora of information concerning the molecular structure of the system investigated. However, when heavy atoms are present, relativistic effects strongly affect the NMR spectra. Even for a simple molecule, they turn the interpretation of the NMR spectrum into a very difficult task. In these cases, relativistic versions of DFT need to be used to achieve a full understanding of the NMR spectra and to elucidate the covalent structure.

Click Chemistry of Metal Complexes of 1,2,4-Triazines

Valery Kozhevnikov

The advancement of bioorthogonal chemistry is supported by the development of novel click reagents. At Northumbria, we have developed a range of innovative reagents based on "clickable" metal complexes of 1,2,4-triazines. In this presentation, I will summarise our key findings: 1) coordination of the 1,2,4-triazine ring to a metal centre substantially accelerates reaction rates; 2) this coordination effect is more pronounced for triazines than for tetrazine analogues; 3) the triazine fragment can be annealed onto metal complexes, providing a useful route to functionalisation; and 4) a dual-function non-canonical amino acid can be incorporated into proteins via genetic code expansion.

Mechanism of Action Directed Implementation of a High Activity Anti-Pancreatic Cancer Lead

Sarah Prayle

The development of Ti(IV) anti-cancer therapeutics has been an area of increased interest over the years having proven an advantageous research route due to their high in vitro activity, lack of development of resistance and their decreased toxicity towards regular tissues. This project aims to develop a complete understanding of the mode of action of Ti(IV) anti-cancer therapeutics against pancreatic cancer, to facilitate it moving to initial pre-clinical testing.

Can relativistic theory benefit drug design?

Martin van Horn

Theoretical and computational chemistry have taken a prominent role in drug discovery, offering a low-risk and cost-effective way to pre-screen pharmaceuticals. Most quantum-chemical methods are based on the Schrödinger equation, which is successful for light-element compounds. However, it breaks down for heavy-element chemistry, where a relativistic treatment is mandatory. Recently, relativistic methods have also helped explain the properties photoactivated cisplatins. This example suggests a broader opportunity for applications of relativistic theory in metal-based drug discovery.

Multi-targeting Ir(III) Catalysts for the Treatment of Ovarian Cancer

Sitah Alsaif

Ovarian cancer remains challenging due to late diagnosis and platinum resistance [1]. We developed three catalytic metal complexes, Ru-1 and Ir-1 [M(arene)Cl(TsEN)], including one bearing a casein kinase 1 inhibitor. All selectively targeted cancer over normal cells. The CK1-containing catalyst overcame cisplatin cross-resistance. Co-administering Ir complexes with non-toxic sodium formate reduced cancer cell viability by 46–51% without affecting non-cancerous HOF cells. These findings support catalytic metal-based therapies as promising strategies for overcoming chemotherapy resistance in ovarian cancer.

[1] Coverdale, J. P.; Romero-Canelón, I.; Sanchez-Cano, C.; Clarkson, G. J.; Habtemariam, A.; Wills, M.; Sadler, P. J. Asymmetric transfer hydrogenation by synthetic catalysts in cancer cells. Nature Chem. 2018, 10, 347–354.

Exploiting 3D Imaging Techniques to Investigate the Cellular Behaviour of Experimental Ruthenium Anticancer Agents

Maha Alshammari

Women's cancers represent a major public health burden, with therapeutic regimens limited by drug resistance and the inability of conventional 2D models to mimic the tumour microenvironment[1,2]. We applied advanced fluorescence imaging to investigate cellular responses in 3D multicellular spheroids following treatment with organoruthenium(II)-pyrithionato complexes[3,4]. The complexes induced reactive oxygen species (ROS) production throughout the spheroid, disrupted cellular membrane integrity, and induced cell death extending into the hypoxic core without a significant reduction in spheroid size. These findings highlight the importance of 3D imaging models for evaluating anticancer agents and investigating drug responses within a physiologically relevant tumour microenvironment.

(1) Cancer Research UK. **2026**.
(2) M. Kapałczyńska et al., *Archives of Medical Science*. **2018**.
(3) J. Kladnik et al., *Chemistry – A European Journal*. **2019**.
(4) J. Kladnik et al., *Cancers*. **2021**.

Metal based anticancer drugs for clinic

Tero Kunnari and Holger Rauter

Producing Metal based drugs in industrial scale differs from ordinary API-manufacture. Specific metal related issues are discussed in this poster and their implication to the production process.

As yet untitled

Julie Ann Lough

Posters (also see Flash talks)

Bio Self-Assembled Molecular Wires

Arjan Lallie

This project aims to develop a self-assembling nanoscale wire by incorporating metal ions throughout a coiled coil peptide. This involves developing a fully metalated coiled coil, binding metal ions throughout the peptide while maintaining a coiled coil structure. Retaining α-helicity while adding more metals is challenging, as the internal residues that drive structure formation must be replaced with destabilising metal-binding residues. To date, the design has been expanded to fit up to 5 metals consecutively throughout the structure

Modulating Metallo-Coiled Coils For MRI Applications

Jade Spector

Gd(III)-based chelates are successful pharmaceuticals. However, concerns rise surrounding Gd(III) toxicity in patients with reduced renal function. This motivates design of platforms with improved stability, by using coiled coils (CC). Inner sphere water is key to MRI relaxivity. We systematically evaluated amino acids with H-bonding side chains within the CC metal binding pocket, to modulate water coordination. We also investigate MRI activity of complexes using metals the body can metabolise. Together, this work leads to better understanding of metallo-CCs as safe MRI contrast agents.

Investigating whether pigment composition is a relevant factor in the binding of iron by neuromelanin

Svitlana Liashenko

Parkinson's disease (PD) is the most common severe movement disorder in the world. One hallmark of PD is loss of dark coloured pigment neuromelanin (NM) - containing dopamine (DA) neurons in the substantia nigra (SN) and locus coeruleus. Iron levels elevated in post-mortem samples, together with the NM degradation in the SN and locus coeruleus in PD, suggests that the failure of the NM-iron system leads to DA neuronal death. NM binds toxic products of dopamine synthesis and iron in pigmented neurons. This project explores iron incorporation into synthetic NM under controlled experimental conditions to rebuild a hierarchy of binding sites and investigate iron localization, NM heterogeneity under physiological and acidic conditions, NM colour variations.

Glutathione-Activated Ruthenium and Osmium Photodynamic Anticancer Agents

Sreshtha Nayek

Photodynamic therapy (PDT) is promising for improved selectivity and reduced side effects in chemotherapy. A major drawback of metal-based PDT agents is intracellular glutathione which quenches radical species and reduces efficacy. The photodynamic potency of novel Ru/Os(II) azo-conjugated polypyridyl complexes is enhanced by GSH. They show light-induced cytotoxicity in A549 cancer cells, with low dark toxicity and good selectivity over healthy cells. Mechanistic investigations show mitochondrial and lysosomal uptake, mitochondrial dysfunction and apoptotic cell death.

Role of axial ligands in antimicrobial activity of Ga(III) complexes

Millie Parton

Antimicrobial resistance (AMR) is a global health problem. Gallium complexes can combat AMR and restore the activity of organic antibiotics by targeting iron pathways. Ga(III) complexes we synthesised show promising antimicrobial activity against Pseudomonas aeruginosa and Escherichia coli Gram-negative bacteria, and uptake studies indicates efficient Ga internalisation. Both activity and uptake increase in Fe-depleted culture medium. We have studied the role of the axial ligands in binding to models of possible biological targets using several analytical technqiues.

Radiolabelled diphosphines for fibroblast-targeted theranostics

Oliver Carter

We have previously developed a versatile diphosphine platform that can be conjugated to a variety of cancer-targeted biomolecules and labelled with diagnostic (64Cu, 99mTc) and therapeutic (188Re) radiometals. Our third generation diphosphine conjugated to a fibroblast activation protein-inhibitor (DP3-FAPi) binds 64Cu and 99mTc in high radiochemical yields and exhibits high stability in human serum. PET/CT and SPECT/CT imaging showed FAP-specific tumour uptake in vivo over 24 h, further validated by ex vivo biodistribution studies.

Mitochondrial hyperpolarization and caspase-dependent apoptosis

Dr. Jitka Pracharova

Mitochondrial hyperpolarization and caspase-dependent apoptosis induced by a benzoate-bearing platinum(IV) oxaliplatin analog in pancreatic cancer cells. The biological effects of the novel Pt(IV) complex trans-[Pt(OBz)2(O,C-10-BzODA)(1R,2R-DACH)] were investigated. Significant anticancer activity was confirmed in 2D pancreatic cancer cells and also in 3D spheroids. In summary, the results indicate that the axial benzoate ligands play a crucial role in modulating mitochondria (mitochondrial hyperpolarization) and inducing apoptotic cell death, highlighting the therapeutic potential of this class of Pt(IV) complexes for cancer treatment.

Bi-nuclear gallium(III) Schiff-base/8-hydroxyquinoline complexes as bone-affine anti-OSC agents

Xiao Feng

Osteosarcoma stem cells (OSCs) drive relapse and metastasis and are poorly eliminated by current chemotherapy. We developed bi-nuclear gallium(III) Schiff-base/8-hydroxyquinoline complexes as bone-affine anti-OSC agents. They are absorbed by bone material and show strong activity against osteosarcoma cells and OSC-enriched sarcospheres, with the lead complex showing potential to induce immunogenic cell death. HSA-binding studies show that this complex family binds strongly to human serum albumin without major structural disruption, improving aqueous solubility and enhancing potency toward bulk osteosarcoma cells and OSCs.

Copper complexes against cancer stem cells

Yihan Wang

Breast cancer relapse is largely driven by therapy-resistant cancer stem cells (CSCs). Here, we investigated a diverse library of copper complexes, including Schiff base derivatives and donor-engineered cyclen complexes, to evaluate their anti-CSC potency. The lead complexes displayed low micromolar cytotoxicity. Mechanistic studies revealed that while Schiff base complexes induce CSC apoptosis via the ROS-mediated JNK/p38 pathway, the cyclen analogues trigger the crucial DAMPs emission, executing immunogenic cell death in breast CSCs. Our findings present copper complexes as versatile scaffolds to eradicate CSCs via complementary pathways.

Assessment of Silver-NHC-Complexes for In-Vitro Activity against human Coronavirus OC43

Judith Füllborn-Ott

An in-cell ELISA protocol using rhabdomyosarcoma (RD) cells and human Coronavirus OC43 as a host cell-virus system was developed for preliminary screening of compounds of interest. To evaluate the method, twelve silver-NHC complexes were successfully synthesized and characterized by NMR, MS and elemental analysis. The complexes were evaluated for their toxicity against RD host cells, antiviral activity as well as their time-of-addition-dependent effect on virus replication and show activity in the low micromolar range.

Gold(I) PROTACs as Potential Degraders of Thioredoxin (Trx) and Thioredoxin Reductase (TrxR):

Nils Wagner

Proteolysis Targeting Chimeras (PROTACs) are currently considered as a powerful new tool in cancer therapy and against infectious diseases. O'Dowd et al. (2023) reported that this concept can be transferred to metal-containing molecules to sucessfully degrade TrxR and Trx with a Cereblon (CRBN) recruiting Pt-PROTAC. To combine this approach with gold(I)-based TrxR inhibitors, a series of various gold(I) PROTAC molecules was synthesized. An in-cell ELISA method was developed to investigate potential degradation effects on TrxR and Trx.

Hyd1 Immobilised on Carbon Generating H2O2 in-situ for Biocatalytic Oxyfunctionalisations

Efstratios (Stratos) Nikolaidis

Industrial production of H2O2 is dominated by the anthraquinone oxidation (AO) process, which is done in organic solvents and is energy intensive. So, there is interest in being able to generate H2O2 in-situ in smaller scales for industries like biocatalysis. In this work, Hydrogenase1 enzyme of E. coli immobilised on carbon oxidises hydrogen, supplying electrons for O_2 reduction by the carbon, under safe H_2-rich and O_2-lean mixtures. This work can then be applied to biocatalytic oxyfunctionalisations using Cytochrome P450 Peroxygenases.

Can Benchtop XRF compete with Synchrotron XRF to image metals in biological tissue?

Elyssa Panja

Synchrotron XRF is an established sensitive and specific tool for chemical imaging of metals. Technology underpinning benchtop XRF imaging systems has since advanced to deliver laboratory systems that offer some of the benefits of synchrotron XRF. We compare the capabilities of a benchtop micro-XRF system with data collected from the same tissue samples at an established synchrotron micro-XRF beamline. The relative capabilities of synchrotron and benchtop micro-XRF approaches are evaluated, considering both the workflow and the quality of the data obtained.

New Ru bis-quinolylpyridine (bqp) derivatives for phosphorescent detection of i-motif DNA

Dr John Fielden

i-Motif (iM) DNA secondary structures form in cytosine-rich sequences, via hemiprotonated cytosine-cytosine base pairs. As their existence in organisms was only confirmed in 2018, there is much to find out about their biological significance and role. Investigation will be assisted by development of luminescent probes compatible with study of living cells. Here, we will present a new family of cis,fac-$[Ru(bqp)_2]^{2+}$ derived complexes designed for this end, and their binding and phosphorescence switch-on with iM and other forms of DNA.

Spatially resolved brain metallomics

Natalie Arigundiya

Spatially resolved brain metallomics requires analytical approaches that preserve endogenous elemental distributions while retaining histological and pathological context. A metal-free, femtosecond laser-etched hierarchical quartz finder grid was developed for correlative optical microscopy and synchrotron X-ray fluorescence imaging. By enabling reliable relocation of identical tissue regions across length scales, this platform supports targeted mapping of metal distribution in neurodegenerative brain tissue, strengthening interpretation of metal localisation in relation to tau-associated pathology.

List of participants

Full Name	Institution/Organisation
Alan Stewart	University of St Andrews
Ana M Pizarro	IMDEA Nanociencia
Anaïs Pitto-Barry	CNRS - Université Paris-Saclay
Andrea Eva Pascui	Johnson Matthey PLC
Anna Peacock	University of Birmingham
Annie Bligh	Saint Francis University
Arjan Lallie	University of Birmingham
Ashwani Chikara	University of Warwick
Carlos Sanchez Cano	Donostia International Physics Center (DIPC)
Cathal Prendergast	Johnson Matthey PLC
Charles Harding	D Young & Co
Christopher A. Wootton	Bruker
Cinzia Imberti	King's College London
Claudia Blindauer	University of Warwick
David Price	Elemental Scientific
Efstratios Nikolaidis	University of Oxford
Elyssa Panja	University of Warwick
Feng Chen	Jiangsu University
Fuyi Wang	Institute of Chemistry, Chinese Academy of Sciences
Giacomo Saielli	CNR Institute on Membrane Technology
Haizhong Zhu	AbbeVie Inc.
Hannah Bridgewater	University of Warwick
Hao Ren	University of Leicester
Holger Rauter	Heraeus Precious Metals GmbH & Co KG
Hongke Liu	Nanjing Normal University
Hongzhe Sun	The University of Hong Kong
Huaiyi Huang	Sun Yat-sen University
Huayun Shi	
Isolda Romero Canelon	University of Birmingham, UK
Iztok Turel	University of Ljubljana
Jade Spector	University of Birmingham
James Coverdale	University of Birmingham
James Thomas	The University of Sheffield
Ji Song	University of Warwick

Jim A THOMAS	University of Sheffield
Jitka Pracharova	Palacky University Olomouc
Joanna Collingwood	University of Warwick - School of Engineering
John Christodoulou	UCL
John Fielden	Lancaster University
John H Viles	Queen Mary, University of London
Judith Füllborn-Ott	TU Braunschweig
Julie Ann Lough	
Kenneth Kam-Wing Lo	Department of Chemistry, City University of Hong Kong
Kevin Barnham	University of melbourne
Liam Chandler	Kore Technology Ltd
Liz Roberts	Kore Technology
Louisa Noffke	LouNovo Consulting
Louise Hair	PerkinElmer
Luca Ronconi	University of Galway, Galway (Ireland)
Luca Salassa	Donostia International Physics Center
Maha Alshammari	University of Birmingham
Maolin Guo	University of Massachusetts Dartmouth
Martin van Horn	University of Birmingham
Martin Wills	The University of Warwick
Miles Postings	University of Warwick
Millie Parton	University of Warwick
Ming Xiao	Science Bulletin | Medicine Plus
Natalie Arigundiya	University of Warwick
Nick Farrell Erica Farrell	Virginia Commonwealth University
Nils Wagner	TU Braunschweig
Oliver Carter	King's College London
Orla Ni Dhubhghaill	University College Cork, Ireland
Patrick J. Bednarski	University of Greifswald
Paul Donnelly	University of Melbourne
Peter J. Sadler	University of Warwick
Peter Scott	University of Warwick
Pingyu Zhang	Shenzhen University
Prinessa Chellan	Stellenbosch University
Rafael Cavalieri Marchi	University of Warwick
Ralph Vokes	Shimadzu UK Limited
Rama Suntharalingam	University of Leicester

Rianne Lord	University of Warwick
Richard Walton	University of Warwick
Rob Deeth	University of \Warwick
Ruizhe Li	University of Warwick
Samya Banerjee	Indian Institute of Technology (BHU), Varanasi
Sarah Prayle	University of Nottingham/University of Birmingham
Shum Prakash	Warwick Innovations
Sirilata Polepalli	University of Warwick
Sitah Alsaif	University of Birmingham
Sreshtha Nayek	University of Warwick
Stephen Barr	Shimadzu UK Limited
Sue Berners-Price	Griffith University
Svitlana Liashenko	University of Warwick
Taeyeon Park	University of Warwick
Taotao Zou	Sun Yat-Sen University
Teresa K. Woodruff	Michigan State University
Tero Kunnari	Heraeus Precious Metals GmbH
Tessa Sadler	
Thomas V. O'Halloran	Michigan State University
Tia E. Keyes	Dublin City University
Valery Kozhevnikov	Northumbria University
Weiping Yang	Boston Children's Hospital
Wojciech Bal	Institute of Biochemistry and Biophysics, Polish Academy of Sciences
Xiao Feng	University of Leicester
Yao Zhao	Institute of Chemistry, Chinese Academy of Sciences
Yihan Wang	University of Leicester
Yogesh Pal	Johnson Matthey PLC
Zijian Guo	Nanjing University