

Research project and supervisor team

1. Research Group in Polymer Composite Materials	
Supervisory Team	Xiaosu Yi ; Xiaoling Liu
Short introduction & description of research project	<ul style="list-style-type: none"> • 3D printing of composite structures • Carbon fibre composite recycling • High-value use of recycled carbon fibre • Multi-functional composites (flame retardant, conductive, toughening, lightning protection, sound absorption, etc.,) • Green and bio-degradable composites
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2. Research Group in New Energy and Environmental Materials	
Supervisory Team	Tao Wu , Cheng Heng Pang , Mengxia Xu
Short introduction & description of research project	<ul style="list-style-type: none"> • Development of environment-oriented single atoms, nano-clusters and monodisperse particles • DFT simulations and controllable preparation of photocatalytic nano-materials for the new generation clean energy • Development of electrocatalytic catalysts for water oxidation, carbon dioxide reduction and nitrogen activation • Metal organic framework synthesis and its applications • Development of novel catalysts for air pollution control (e.g., Hg0, NOx, VOCs) • Development of novel catalysts for wastewater treatment • Development of catalysts for low temperature steam and bio-oil reforming • The effect of hydrogen and oxygen co-spillover on coke resistance of Ni based catalysts for dry reforming of methane • Supercritical CO2 reforming of methane • Electrochemical upgrade of CO2 from amine capture solution • Machine learning for accelerated discovery of energy and environmental materials • Integration of data-intensive and experimental approaches for accelerated discovery of catalysts

	<ul style="list-style-type: none"> • Deriving clean and sustainable energy from renewable sources (biomass, agricultural wastes, MSW, etc) via green thermo-chemical processes • Green synthesis of advanced carbon materials (graphene materials, quantum dots, etc) from renewable sources for specific applications, e.g., combined anti-cancer therapy, bone scaffolding • Recycling of industrial and municipal wastes as value-added products to reduce carbon footprint and to provide waste management • Harmless treatment and resource utilization of hazardous solid wastes (e.g., fly ash) • Microwave-assisted thermal conversion of organic solid wastes (e.g., sludge and plastics) • Microwave-assisted synthesis of carbon materials and novel catalysts • Process design of microwave-assisted catalytic reforming • Synthesis and fabrication of advanced titanium alloy components via the near-net-shape electrochemical metallisation process • Electrochemical production of high-entropy alloys • Sustainable spent fuel reprocessing via molten salt electrolysis • Advanced functional materials for electrochemical energy storage • Understanding the exciton dynamics and structure-property relationships in molecular aggregates • Developing new materials for next-generation solar energy to support a terawatt photovoltaic industry • Simulations of materials for biomedical and industrial applications
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3. Research Group in Granular Materials and Geotechnolgy	
Supervisory Team	Yunming Yang ; Juan Wang ; Bo Li ; Yung-Tsang Chen
Short introduction & description of research project	<ul style="list-style-type: none"> • Low-carbon geotechnical materials • Low-carbon geotechnical structures • Waste recycling geotechnolgy • Long-term response and shakedown of geo-structures under cyclic loads • Special soils for transportation infrastructure • Advanced materials and technologies for pavement maintenance • Behaviour of geomaterials under multiple dimensional principal stress rotations • Study of soil-structure interactions • Sustainable construction materials

	<ul style="list-style-type: none"> • Fiber reinforced cementitious composites for construction • Seismic design of shear-type buildings with braces and nonlinear viscous dampers. • Damage detection of civil infrastructures subjected to changing environmental and operational conditions • Seismic vibration control of building structures with passive energy dissipation devices
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4. Research Group in Advanced Nanomaterials and Electronic Devices	
Supervisory Team	Jim Greer ; Guang Zhu
Short introduction & description of research project	<p>Current research projects include:</p> <ul style="list-style-type: none"> • Stretchable and ultra-robust electrode • Flexible tactile sensors • Fast-response soft robots • Flexible nanogenerators based on ultrafast 3D printing • Surface chemistry and characterisation of bismuth thin films for nanoelectronics and spintronics • Electronic structure and charge transport in semiconductor nanowires • Many-electron interactions in nanostructures • Interplay between surface functionalization and quantum confinement in semiconductor and semimetal thin film
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