List of A*STAR Researchers for A*STAR Research Attachment Programme (ARAP)

S/N	Name	Salutation	Designation	Research Institute	Email Address	Description of Research Area/Focus	URL to Profile Page
1	CHIAM Keng Hwee	Dr	Senior Principal Investigator	Bioinformatics Institute (BII)	chiamkh@bii.a-star.edu.sg	My research group focuses on computational modeling of the biophysics and biomechanics of cells and tissues. We work very closely with wet lab groups in this area, collaborating to analyze data and develop models. Some recent collaborative projects include the molecular mechanisms of mechanosensing --- how cells sense the rigidity of the substrate --- and durotaxis --- how cells seem to migrate up a rigidity gradient. Potential projects include how cells sense and respond to cyclical stretching, the role of microtubules in mechanobiology (the emphasis has been on the actomyosin network all these while), etc.	https://web.bii.a-star.edu.sg/~chiamkh
2	Igor N. Berezovsky	Dr	Senior Principal Investigator	Bioinformatics Institute (BII)	igorb@bii.a-star.edu.sg	The research in my laboratory focuses on allosteric regulation of protein function, evolution of protein function, chromatin structural dynamics and epigenetic regulation, protein thermostability and adaptation to other extreme environments	https://www.a-star.edu.sg/bii/research/bmad/pebm
3	Kumar Selvarajoo	Dr	Senior Principal Investigator	Bioinformatics Institute (BII)	kumar_selvarajoo@bii.a-star.edu.sg	My lab focuses on computational biology, systems biology and transcriptomics data analytics. We create dynamic models to understand protein signalling and metabolic network response to diverse perturbations, e.g. genetic mutations, drug perturbations, to observe the resultant behaviours. Also, we study the transcriptome-wide time-series differential expressions and noise analysis between different samples and conditions. Our lab has published numerous works in the field and are open to collaborators for synergising our research and ultimate goals.	http://combio-sifbi.org
4	LEE Hwee Kuan	Dr	Senior Principal Investigator	Bioinformatics Institute (BII)	leehk@bii.a-star.edu.sg	The Computer Vision and Pattern Discovery for BioImages group uses advanced computer vision, machine learning and mathematical models to build better machines; for the improvement of health care and discovery of biological knowledge. The group analyses images of tissue, histological slides and 2D/3D live cells assays. These images were acquired using wide-field, confocal and light-sheet microscopes as well as infra-red camera and other kinds of clinical image devices. In a clinical setting, imaging techniques are becoming important as they are usually non-invasive and advancement of clinical devices has made quantitative analysis of these images an important component for improving health care. Motivated by the desire to device better cures for diseases and driven by enabling technologies, biological experiments are becoming more quantitative and generating large amounts of data. These images are then analyzed and used to create new biological hypotheses that are further validated using other experimental means. The group is also working towards the development of better image acquisition protocols to acquire high quality microscopy images.	https://web.bii.a-star.edu.sg/~leehk/index.html

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5	Mohamed Helmy	Dr	Senior Bioinformatics Specialist	Bioinformatics Institute (BII)	mohamed_helmy@bii.a-star.edu.sg	Our research focuses on the applications of data mining and machine learning technique on omics data (especially transcriptomic) for pathway identification. Our research interests are centred around understanding the disease and regulation mechanisms on the molecular level.	https://scholar.google.com/citations?user=Ccx_2agAAAAJ&hl=en
6	Peter Bond	Dr	Senior Principal Investigator	Bioinformatics Institute (BII)	peterjb@bii.a-star.edu.sg	Our research uses computational modelling and multiscale simulation approaches, to elucidate mechanisms of biomolecular systems and develop new therapeutic strategies. We enjoy interacting closely with our experimental collaborators, helping to integrate and interpret structural, biophysical, or biochemical data into unifying models. We have a particular interest in host-pathogen interactions and infectious disease, and are contributing to antibody/vaccine strategies for enveloped viruses such as dengue and SARS-CoV-2, and to new classes of antibiotics targeting Gram-negative bacteria.	https://www.a-star.edu.sg/bii/research/bmad/msmd
7	Roland Huber	Dr	Assistant Principal Investigator	Bioinformatics Institute (BII)	rghuber@bii.a-star.edu.sg	My laboratory focuses on the structure and function of RNA. We use computational techniques to identify functional structures in mainly viral genomes to enable the development of novel therapeutics targeting these structures. I would like to collaborate with experimental or computational labs that work in the area of RNA, virology and structural biology.	https://www.a-star.edu.sg/bii/research/bsfd/fsrna
8	Sebastian Maurer-Stroh	Dr	Executive Director	Bioinformatics Institute (BII)	sebastianms@bii.a-star.edu.sg	Our group expertise is in computational protein sequence and structure analysis to predict various aspects of molecular and cellular functions (enzymatic activities, 3D structures, effects of mutations, phylogenetic relationships etc.) for discovering the molecular mechanisms of biological and clinical phenotypes and experimental validation together with collaborators. Our repertoire of computational analysis methods is applicable and useful in multiple research areas but our main focus currently is on infectious diseases, allergy and human mutations. We are therefore interested in collaborations and joint students in the following 3 areas: 1. Computational sequence and structure analysis to combat viral infectious diseases (flu, rsv, SARS-CoV-2 etc, close collaboration with GISAID and global networks) 2. Computational sequence and structure analysis to study protein allergenicity (e.g in novel food) 3. Computational sequence and structure analysis using AI for evaluating genetic variants in human diseases	https://pubmed.ncbi.nlm.nih.gov/?term=Maurer-Stroh&sort=date
9	TAN Yaw Sing	Dr	Assistant Principal Investigator	Bioinformatics Institute (BII)	tanys@bii.a-star.edu.sg	The research in my group focuses on the use of molecular modelling methods to understand how biomolecules interact with one another and chemical compounds, with particular emphasis on therapeutic design and the understanding of biochemical mechanisms. I am interested in collaborating with groups that are involved in medicinal chemistry, chemical biology, or drug discovery.	
10	CHEN Kok Hao	Dr	Senior Research Scientist	Genome Institute of Singapore (GIS)	chenkh@gis.a-star.edu.sg	The research in my laboratory focuses on understanding disease heterogeneity with spatially resolved transcriptomics. Spatial transcriptomics is a new kind of 'in situ omics' technology that can reveal	https://khchenlab.github.io/

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						molecularly defined cell types, gene networks, as well as cellular signaling events within their spatial context, all of which are critical for understanding tissue biology and disease mechanisms.	
11	Mile Sikic	Dr	Group Leader	Genome Institute of Singapore (GIS)	mile_sikic@gis.a-star-edu.sg	Our laboratory's research focuses on developing new algorithms and AI methods for the analysis of DNA and RNA sequencing data (mostly long reads). We have recently started work in developing new methods for determining RNA structure (RNA folding). We have expertise in developing new approaches for genome assembly, DNA and RNA mapping, rapid detection of microbes in metagenomics samples, basecalling and detection of modified RNA and DNA nucleotides using raw sequencing signal. Besides classic algorithms and data structures, in our work, we combine knowledge from graph neural networks, NLP (i.e., attention architectures) and reinforcement learning to improve our algorithms in genomics. Being located at Genome Institute of Singapore, we have a rare opportunity to use abundance of real biological data and conceive new experiments with our wet lab colleagues. We see ourselves as an interface between computer science and genomics. We collaborate with researchers from around many universities and companies such as DeepMind, NVIDIA, Intel and Oxford Nanopore Technologies. Furthermore, we have access to the newest hardware (CPU and GPU servers). Most contemporary algorithms and AI methods have been created to solve challenges related to images, texts and sounds. Our aim is the development of new algorithms and AI methods inspired by challenging problems in genomics. We want to collaborate with computational groups that have expertise in algorithms and/or machine learning.	https://scholar.google.com/citations?user=EK7apmcAAAAJ
12	LIU Yan	Dr	Senior Scientist II, Team Leader	Institute for Chemical & Engineering Sciences (ICES)	liu_yan@ices.a-star.edu.sg	1. The research in my laboratory focuses on CO2 catalytic utilization to value added products, including but not limited to methanol, ethylene, ethanol, formic acid, and so on. I am interested in developing the aspiring PhD candidates on confined single atom and sub-nanocluster catalytic materials as well as reaction mechanism studies using in situ advanced characterization techniques. I would like to collaborate with groups which are interested in decarbonlizaiton and have expertise in catalytic materials development. The research will contribute to a low carbon economy. 2. To achieve a sustainable and low-carbon economy, renewable hydrogen storage for stationary and mobile applications in liquid organic hydrides is one of the promising options for safe storage and long distance transport of renewable hydrogen. Our research group has been targeting to develop highly effective hydrogenation / dehydrogenation catalysts to facilitate an efficient renewable hydrogen production and transportation with deep understanding through in situ and ex situ advanced characterization. We would like to collaborated with research groups with common interests on catalysts development in renewable hydrogen areas. The research will contribute to a low carbon and sustainable H2 based economy.	

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13	Satyasankar Jana	Dr	Senior Scientist I and Team Leader	Institute for Chemical & Engineering Sciences (ICES)	satyasankar_jana@ices.a-star.edu.sg	The research focus of me and my research team includes controlled radical polymerizations (ATRP, RAFT), functional polymers like antifouling zwitterionic polymers, polymeric dispersants, non-isocyanate polyurethanes (NIPU) and their applications, self-healing polymers, CO2 derived carbonate polymers, ion conducting polymers, smart/ intelligent/ stimuli (pH, heat, light etc.) responsive polymers, carbon-carbon main chain chiral polymers and high-throughput polymer synthesis and characterizations, core-shell polymer nanoparticles, suspension and emulsion polymerization, no-VOC waterborne coatings, IR-reflective cool coatings and LiDAR recognizable coatings enhancing AV navigation etc. I have been collaborating with a numerous companies and Singapore based research institutes last few years. I am keen to collaborate with the research groups working on above mentioned areas of Polymer Science and Technology or complementary fields.	
14	Bharathi Madurai Srinivasan	Dr	Senior Scientist III	Institute of High Performance Computing (IHPC)	srinivasan@ihpc.a-star.edu.sg	I am now working in modelling and simulation of structural batteries. Development of light weight batteries with higher energy and occupying lesser space plays an important role in advancing electrification of transportation. One of the potentially viable strategy is to develop structural energy storage devices (e.g. structural supercapacitors, structural batteries) which can result in light weight batteries with high energy density and also save space, being part of the structure. Theoretical and modelling studies of these structural energy storage devices need integration of the electrochemical, mechanical thermal processes that determine their operation and life. These processes span a widely varying length and time scales. The proposed research involved developing a multiphysics multiscale modelling platform that integrates electrochemical and mass transport models to a finite element mechanical solver and develop numerical schemes for simulating the platform over a range of relevant parameters. Such a platform will enable modeling and simulation of the properties, design and performance of structural battery materials.	
15	Farzam Farbiz	Dr	Senior Scientist II	Institute of High Performance Computing (IHPC)	Farzam_Farbiz@ihpc.a-star.edu.sg	My current research interest is on AI for manufacturing. This includes: • Physics/knowledge based AI • Federated Learning • Lifelong learning	
16	Fei GAO	Dr	Senior Scientist	Institute of High Performance Computing (IHPC)	gaofei@ihpc.a-star.edu.sg	I am interested in research and development in lifelong learning, automated machine learning, AI system and platform, AI verification and validation.	
17	FENG Yangqin	Dr	Scientist	Institute of High Performance Computing (IHPC)	feng_yangqin@ihpc.a-star.edu.sg	I am interested in developing domain adaptation algorithms for medical image analysis.	
18	Jason PNG	Dr	Department Director	Institute of High Performance Computing (IHPC)	pngce@ihpc.a-star.edu.sg	Our department focuses on the theory, modeling, and simulation of following areas: • Physics-based Artificial Intelligence (AI) • UVC LED Efficiency and Safety Studies	https://scholar.google.com/citations?hl=en&view_op=list_works&gmla=AJsN

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						• Wireless Charging and Tagging • High speed communications • Quantum Photonics • Silicon Photonics	F6mxJkrL3mMZ9ET3bpwg5a96QKuocC8vJl51qLoUVqnDjiN7RY7MbbWuDObjwTHbQpld7komamsAGTEItPZtSoO-22iFiP04Garjvj1aSM3Z1XvQ4M&user=NB46eToAAAAJ
19	Joey ZHOU Tianyi	Dr	Senior Scientist	Institute of High Performance Computing (IHPC)	Joey_Zhou@ihpc.a-star.edu.sg	We aim to develop on-device full stack AI system from the ground up that facilitates widespread AI adoption within mobile and embedded platforms. To achieve this goal, we need to tackle challenges rising in the on-device AI system, such as large low-fidelity data, constrained computing resources. I propose to build the TinyML framework with the following three sub-aims: A) tiny data, B) tiny algorithm, C) tiny hardware. Together, these aims work in tandem to advance the principles and practice of TinyML to on-device AI system.	https://joeyzhouty.github.io/
20	Joyjit Chattoraj	Dr	Scientist	Institute of High Performance Computing (IHPC)	Joyjit_Chattoraj@ihpc.a-star.edu.sg	My broad research interest is AI-accelerated design of amorphous materials. These materials including metallic glass, polymers, and granular materials vastly control and shape our everyday lives. Examples include personal care products (toothpaste, deodorant, hair gel, shampoo), plastics, cement, paints, foams, food products (mayonnaise, ice cream), or even biological tissues. Under external stimuli, amorphous materials deform elastically, beyond critical stress the deformation becomes plastic and it displays many characteristic flow behaviors such as viscoelastic, elastoplastic, viscoplastic, etc. Tuning the flow properties is key for the performance of such materials that have been inviting intense research over the last few decades. The focus here is to develop numerical models by leveraging physics-guided artificial intelligence coupled with discrete numerical simulations, which explore the correlation between formability, functional properties, and structural performance of amorphous materials.	https://scholar.google.com/citations?user=snRMdk4AAAAJ&hl=en
21	LI Shaohua	Dr	Scientist	Institute of High Performance Computing (IHPC)	li_shaohua@ihpc.a-star.edu.sg	I am interested in developing novel AI algorithms for production-level text-to-image translation.	
22	Liangli ZHEN	Dr	Scientist	Institute of High Performance Computing (IHPC)	zhenll@ihpc.a-star.edu.sg	Research Topic: Efficient Machine Learning During the last decade, machine learning, especially deep learning, has achieved a great success in various domains, such as manufacturing, transportation, and healthcare. However, it comes at the cost of high computation requirement for training and inference. In this project, we focus on improving the computation efficiency using multi-objective optimisation. Specifically, we will explore the model compression and neural architecture search by considering the trade-offs between the desired objectives, such as prediction accuracy, model size, energy efficiency, latency, etc.	https://liangli-zhen.github.io/
23	LIU Yong	Dr	Senior Scientist III and Deputy	Institute of High Performance	liuyong@ihpc.a-star.edu.sg	The research in my research group focuses on multimodal machine learning, transfer learning, automated machine learning with the applications in healthcare domain such as medical image analysis, image	https://scholar.google.com/citations?user=QujHYk0AAAAJ&hl=en

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			Department Director	Computing (IHPC)		segmentation, domain adaption for diseases diagnosis and progression prediction. I would like to collaborate with groups which are interested in machine learning algorithms in the areas of multimodal machine learning, transfer learning, automated machine learning, continuous learning, self-supervised learning and healthcare applications.	
24	LUO Tao	Dr	Research Scientist/Group Manager	Institute of High Performance Computing (IHPC)	luo_tao@ihpc.a-star.edu.sg	Description of Research Area/Focus - The research in my laboratory (HPC group) focuses on devising efficient solutions for important applications with AI/ML techniques using advanced computing paradigm and hardware. Here are three topics we are interested in: • Efficient AI for edge-AI computing: developing energy-efficient/real-time object detection/NLP solution on edge devices: embedded GPU, FPGA, and ASIC accelerators. (Luo Tao, Wang Zhehui, Huang Tian) • Hardware/Software co-optimization for machine learning system: designing efficient ML models considering hardware efficiency. (Luo Tao, Cui Yingnan, Yang Liwei) • Quantum computing for optimization problems. (Dax, Kang Feng, Luo Tao) - I would like to collaborate with groups that are interested in developing efficient solutions for AI/ML and optimization applications. The targeting groups should have expertise in advanced computing systems such as GPU, FPGA, domain-specific accelerator, and quantum computer as well as expertise in AI/ML applications.	https://www.a-star.edu.sg/ihpc/ihpc-research-capabilities
25	Mark Jhon	Dr	Senior Scientist	Institute of High Performance Computing (IHPC)	jhonmh@ihpc.a-star.edu.sg	My research focuses on the microstructural evolution, deformation and failure of materials. I am interested in particular in understanding stochastic microstructures and processes and developing multiscale models that can capture the hierarchical structure of engineering materials. I am interested in collaborating with other groups to (i) develop fundamental understanding of these complex phenomena, (ii) to improve the predictive power of simulations by merging disparate models and data sources and to (iii) accelerate these simulations to enable their practical use.	
26	Michael Sullivan	Associate Professor	Department Director, Materials Science and Chemistry	Institute of High Performance Computing (IHPC)	michael@ihpc.a-star.edu.sg	Our research focuses on using modeling and simulation to address problems in materials chemistry and catalysis. We use first principles methods and molecular dynamics to study a variety of problems including catalyst design, polymers, renewable energy, and a low-carbon future.	https://scholar.google.com/citations?user=UyDA3HkAAAAJ&hl=en
27	MING Yan	Dr	Scientist	Institute of High Performance Computing (IHPC)	mingy@ihpc.a-star.edu.sg	1. Learning-to-Learn for Low-resource NLP. Our research focuses on learning a generic feature/representation from multiple source domains that can quickly adapt the learned features to low-resource target domain tasks. 2. Performance-Supreme Learning for Low-resource NLP. Our research focuses on study all possible learning theories or approaches to promote	

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						the model performance in the inference/deploy stage. 3. Resource-Aware Learning for Low-resource NLP. Our research focuses on adapt large PTM to low-resource edging/IoT devices (i.e., the model size, memory/computing budget), which as possible keeps its original performance in the low-resource setting.	
28	Ping LIU	Dr	scientist II	Institute of High Performance Computing (IHPC)	liup2@ihpc.a-star.edu.sg	Video semantic segmentation is to predict the semantic label for each pixel in each frame of a given video. It can automatically identify objects and backgrounds in a video and therefore becomes one of the key technical cores in autonomous driving. To train a deep neural network for semantic segmentation, it usually costs huge amounts of labeled data. Unfortunately, in video based semantic segmentation, pixel-level labeling is time-consuming and very expensive. An alternative would be resorting to simulated data, such as computer-generated audios and scenes. By taking advantages of those simulated data, researchers can construct a semantic segmentation network without or with few manually labeling costs. In this research project, we mainly focus on the following aspects: 1) Video semantic segmentation. We will propose a deep learning framework to conduct video based semantic segmentation. Comparing to previous image based semantic segmentation, our proposed method can take advantage of temporal consistency between frames to conduct the segmentation in high efficiency. More than that, by taking advantage of spatial and temporal context information, our proposed method can achieve higher prediction accuracy. 2) Unsupervised domain adaptive video semantic segmentation. We will propose an unsupervised domain adaptive semantic segmentation for video input. This proposed framework can take advantages of simulated image data and transfer the knowledge to our final target: video based semantic segmentation.	https://sites.google.com/site/pingliu264/
29	Rakhi Manohar Mepparambath	Dr	Scientist I	Institute of High Performance Computing (IHPC)	Rakhi_Manohar_Mepparambath@ihpc.a-star.edu.sg	I am a part of Complex Systems research group in Systems Science (SS) Department of Institute of High Performance Computing (IHPC). My research focus is on transportation systems modelling and simulation. I am particularly interested in modelling the choices made by the users of the transportation systems and the impact of such choices on the system performance. Our research group is currently working on a research project where we develop a multi-modal transport simulator for Singapore. The objective of this multi-modal simulator is to act as a decision support tool for the transport planners. Some of my previous work was on modelling and simulation of urban freight, which is another area of interest for me. Therefore, I would like to collaborate with groups that are interested in transportation systems modelling, urban freight modelling and discrete choice modelling.	
30	Ramanarayan Hariharaputran	Dr	Senior Scientist II	Institute of High Performance Computing (IHPC)	hariharaputran@ihpc.a-star.edu.sg	I am interested in computational materials science and mechanics. My research expertise include Atomistic modelling using Molecular Dynamics and Monte Carlo methods, Continuum modelling using Phase field model, Nucleation phenomena,	

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						Transport kinetics, Crystallization process, Kinetics of phase transformation, Pattern formation in materials by heat and mass transport, Elastic effects on thin film evolution, Structural stability of nanostructures, Characterization of interfaces such as surfaces and grain boundaries. My current research directions include 1. Microstructural engineering during Additive manufacturing The project involves using continuum modelling with integrated thermodynamic and kinetic databases, addressing microstructural evolution due to rapid thermal cycling in Additive manufacturing. 2. Growth kinetics of 2D materials and Thin films The emphasis of this study is to understand nucleation and growth using Monte Carlo method, Molecular dynamics and phase field modelling to simulate 2D material growth 3. Thin film growth towards new age piezoelectric and ferroelectric devices The research direction attempts to understand the underlying reasons for defect formation during thin film growth through atomistic and continuum modelling and develop strategies towards defect mitigation by process control during thin film growth. This research direction also attempts to correlate the defect density formed during the film growth and piezo/ferroelectric property of the thin film.	
31	Renuga Kanagavelu	DR	Scientist	Institute of High Performance Computing (IHPC)	renuga_k@ihpc.a-star.edu.sg	I am interested in developing clustered federated learning that is capable to handle client populations that vary over time and can be implemented in a privacy-preserving way.	
32	Ricardo Shirota Filho	Dr	Scientist	Institute of High Performance Computing (IHPC)	ricardo_shirota_filho@ihpc.a-star.edu.sg	My research group focuses on AI and machine learning, with special focus on automated machine learning. We are also interested in verification and validation of AI models in general. We are also interested in collaborating with groups with expertise in natural language processing, specifically for complex information parsing and domain representation using knowledge graphs.	
33	Rick Siow Mong GOH	Dr	Director of Computing & Intelligence, Senior Scientist	Institute of High Performance Computing (IHPC)	gohsm@ihpc.a-star.edu.sg	Dr Rick Goh is the Director of Computing & Intelligence (CI) Department at the Institute of High Performance Computing (IHPC), a research institute under the Agency for Science, Technology and Research (A*STAR). Rick leads a team of more than 70 scientists and engineers in performing world-leading scientific research, developing technology to commercialisation, and engaging and collaborating with industry. His department's core capability areas are Artificial Intelligence (AI) and Advanced Computing. For AI, his team focuses on physics-based, efficient, multimodal, autonomous,	https://sites.google.com/view/rickgoh/home

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						and safe AI. And for Advanced Computing, the focus is in high performance computing using GPU and FPGA, and decentralised computing such as blockchain and federated learning. Rick is seeking collaborators and students in both Use-Inspired Basic Research (UIBR) and also Applied Research in the areas of AI and Advanced Computing for application domains such as Digital Healthcare/MedTech, Manufacturing, Trade & Connectivity, Smart Nation & Digital Economy, and Food & AgriTech.	
34	Saurabh Aggarwal	Dr	Scientist	Institute of High Performance Computing (IHPC)	Saurabh_Aggarwal@ihpc.a-star.edu.sg	topic: Graph Based Knowledge Representation learning. In general, the research focus will be on problems where relationship between entities in AI is difficult to be represented in linear/Euclidian space. We will explore the use graphs for representing these complex relations and use them with AI/ML techniques for delivering the desired output.	https://scholar.google.com/citations?user=N3uH55QAAAAJ&hl=en
35	Shaista Hussain	Dr	Scientist	Institute of High Performance Computing (IHPC)	hussains@ihpc.a-star.edu.sg	The research focus of our team is to develop AI models by integrating machine learning and physics-based modeling approaches for providing solutions to complex scientific and engineering problems. I am interested in pursuing research in this area, particularly, in employing physics-based AI approaches to provide new insights into disease mechanisms, which can help identify new targets and treatment strategies.	https://www.linkedin.com/in/shaista-hussain-43735028/?originalSubdomain=sg
36	SU Zhoucheng	Dr	Scientist	Institute of High Performance Computing (IHPC)	suzc@ihpc.a-star.edu.sg	My current research interests include mechanics of composite materials, damage modelling of CFRP composites, multiscale modelling of composite materials across different length scales, machine learning models based on computational models, multiscale modelling of polymers and particulate reinforced polymers, and lightweight design of structures. I am also actively looking into multi-physics modelling composite materials, computational models for hybrid structures and Integrated Circuit (IC) packaging, etc.	
37	Tanvi Verma	Ms	Research Scientist II	Institute of High Performance Computing (IHPC)	Tanvi_Verma@ihpc.a-star.edu.sg	My research focuses on lifelong continual learning, reinforcement learning, game theory and auto ML. The current literature on continual learning mainly focus on classification tasks with rigid assumption of non-overlapping classes in each learning task. I am interested in expanding the horizon of incremental learning for other AI tasks such as reinforcement learning, learning equilibrium strategies in game theoretic settings etc. Another use case is to cater to more practical scenarios of image classification where there is overlap of classes in learning tasks. I would like to collaborate with groups which work on computer vision/deep learning problems and are interested in working on continual lifelong learning.	https://sites.google.com/view/tanviverma
38	Tomasz Karol Maszczyk	Dr	Scientist	Institute of High Performance Computing (IHPC)	https://scholar.google.com/citations?user=VjErRxEAAAAJ&hl=th	Topic: Knowledge-informed medical time-series data analysis I would like to collaborate with groups or individuals who are interested in medical time-series (i.e. EEG) data analysis. The main objective would be to combine classical machine learning techniques with knowledge provided by experts (doctors). In addition to this I would like to combine such	https://scholar.google.com/citations?user=VjErRxEAAAAJ&hl=th

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						knowledge-informed algorithms with information extracted from medical imaging data (i.e. MRI).	
39	WANG Dan	Dr	Scientist	Institute of High Performance Computing (IHPC)	wangd@ihpc.a-star.edu.sg	I am interested in developing optimization methods for exploring the large design space of novel composite materials and hierarchical structures due to their high tailorability. The areas we have already explored are curved stiffener layout optimization for grid-stiffened composite structures and curved fiber path optimization for bi-stable structures. Another area we plan to explore is non-uniform lattice design optimization. I am also interested in developing multiscale modelling and reduced-order modelling techniques in order to better combine them with gradient-based optimization algorithms. I would like to collaborate with groups which are interested in novel composite and hierarchical structural design optimization or the relevant modelling techniques.	https://scholar.google.com.sg/citations?user=IXidTCcAAAAJ&hl=sg
40	WEI Qingsong	Dr	Senior Scientist	Institute of High Performance Computing (IHPC)	wei_qingsong@ihpc.a-star.edu.sg	I am interested in developing core technologies of decentralized Federated Learning in large scale with privacy-preserving including architecture design, No-IID data study, privacy-preserving technology such as MPC and DP, communication overhead reduction, weighted or personalized model aggregation.	https://scholar.google.com.sg/citations?user=7mRTEp0AAAAJ&hl=en
41	XIAO Zhe	Dr	Research Scientist	Institute of High Performance Computing (IHPC)	xiaoz@ihpc.a-star.edu.sg	This research investigates on the key technologies and critical subjects of intelligent systems, mainly focuses on two aspects - fundamental research and industrial applications of intelligent systems. The fundamental research aims at solving the common and critical problems/challenges in existing intelligent systems like interoperability research (Semantic Ontology), AI based model for system intelligence, cyberinfrastructure and the computing facility for large-scale intelligent systems, Quality of Service (QoS) in intelligent systems. In terms of industrial applications, the research will focus on several specific domains that I already have established capability, including transportation, crowdsensing applications in the smart cities, and cross-organizational smart logistics etc., which are aligned with the key research directions in systems science department, IHPC. Through the research studies, the Ph.D. candidate student will work with me on proposing novel (expected to be impactful) methodologies to address the common fundamental challenges of intelligent systems from data/signal processing, AI based modelling, to practical domain use cases. The research outcome includes impactful publications, patents, recommendation draft for standards and working systems.	https://www.linkedin.com/in/xiaozhejesse/
42	Xiuju FU	Dr	Senior scientist	Institute of High Performance Computing (IHPC)	fuxj@ihpc.a-star.edu.sg	My team focuses on maritime traffic safety research with big AIS data and other relevant data. I would like to collaborate with groups who are interested in vessel trajectory prediction, collision risks, traffic situation awareness study, based on big data analytics, simulation and optimization.	

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43	XU Haiyan	Dr	Senior Scientist	Institute of High Performance Computing (IHPC)	xuh@ihpc.a-star.edu.sg	I would like to collaborate with groups that are interested in statistical learning, such as but not limited to longitudinal data analysis, growth mixture model, clustering analysis, predictive model, risk evaluation, and accelerate life/degradation testing.	
44	XU Xinxing	Dr	Scientist	Institute of High Performance Computing (IHPC)	xuxinx@ihpc.a-star.edu.sg	The research in my team focuses on machine learning, deep learning and their applications in digital healthcare.	
45	XU Yanyu	Dr	Scientist	Institute of High Performance Computing (IHPC)	xu_yanyu@ihpc.a-star.edu.sg	I am interested in developing deep learning algorithms for learning with less annotations.	
46	YANG Feng	Dr	Senior Scientist	Institute of High Performance Computing (IHPC)	yangf@ihpc.a-star.edu.sg	- My research interests include Physics-based Machine Learning to integrate machine learning with physics/domain knowledge, as well as its applications to various problems, such as diagnosis and prognosis in advanced malfunction, material design, healthcare. - I would like to collaborate with groups that are interested in physics-based AI, or applying physics-based AI into their problems.	https://www.linkedin.com/in/feng-yang-9306b24/
47	YE Jun	Dr	Scientist III	Institute of High Performance Computing (IHPC)	yej@ihpc.a-star.edu.sg	- My research focuses on using computational tools to model and simulate optical, electronic, and transport properties of organic materials, including small molecules and polymers. - My research interests include: 1. Quantum chemistry (with focuses on calculation and analysis of non-covalent intermolecular interactions in organic molecular crystals and molecule design, electron-vibrational coupling, intermolecular electronic coupling, and charge carrier transport) and quantum computational chemistry (quantum computing). 2. Quantum computing software and algorithms for quantum chemistry and general Hamiltonian simulations. 3. AI-accelerated chemical and materials discovery. 4. Molecular dynamics simulations for small molecular and polymeric materials. 5. Enhanced sampling techniques (such as metadynamics) with applications to the nucleation and growth of molecular organic crystals. 6. Exciton-phonon, electron/hole-phonon interaction, and quantum dynamics. 7. Theoretical non-linear optical spectroscopy. - I would like to collaborate with groups that are interested/have expertise in: 1. applying quantum computers in understanding and simulating	https://scholar.google.com.sg/citations?user=ol6ySfMAAAAJ&hl=en

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						quantum chemistry. 2. understanding structure-property relationships for organic molecular crystals and polymers from experimental or complimentary theoretical/simulation perspectives. 3. experimental studies of nucleation and growth of small organic molecular crystals.	
48	YU Xiang	Dr	Research Scientist III	Institute of High Performance Computing (IHPC)	yuxiang@ihpc.a-star.edu.sg	My research interests include vibroacoustic modeling, noise and vibration control, hearing-aid technology, porous and lattice material, acoustic metamaterial, and acoustic black hole theory. I would like to collaborate with groups which are interested in the general disciplines of sound and vibration.	https://scholar.google.com/citations?user=tBDygVgAAAAJ&hl=en
49	ZHANG Gang	Dr	Senior Scientist, Group Manager	Institute of High Performance Computing (IHPC)	zhangg@ihpc.a-star.edu.sg	The research in my laboratory focuses on using atomistic simulations and artificial intelligence to study electronic, thermal, mechanical and optical properties of novel materials and structures in important engineering problems, including thermoelectrics, solar photovoltaic, Li-battery, thermal protection, thermal management in smart phone, power electronics and integrated circuits. I am interested in developing a fundamental understanding of the processes underlying important new technologies and to establish atomistic simulations as a tool for material and device design. I would like to collaborate with groups which are interested in condensed matter physics, theoretical physics, mechanical engineering, and application of artificial intelligence for material science and technology.	https://scholar.google.com.sg/citations?user=iDfm2r8AAAAJ&hl=en
50	ZHANG Zhiqian	Dr	Senior Scientist II / Group Manager	Institute of High Performance Computing (IHPC)	zhangz@ihpc.a-star.edu.sg	The research of my team has been focusing on the modeling material behaviors in cold spray additive manufacturing process, closely collaborating with IMRE and ARTC teams for experimental supports. In the past years, we have successfully completed several projects sponsored by industry partners such as Honeywell, Rolls-Royce, SAFRAN, Boeing, and local companies such as ECK, ST Kinetics; currently we are working on several programmes related to CSAM, and engaging new projects with industry partners. The strong and solid capabilities developed through the past years have gained lots of interests from academic and industrial communities. We are seeking the opportunities in ARAP to involve PhD Students to help them understand the most advanced development in this area, and also enrich our research extensively on the topic: Multiscale crystal plasticity finite element model in Eulerian framework for microstructural evolution of metal/metal alloys under extreme conditions. The motivation is provided as below. Obtaining very small grains in polycrystalline metals and alloys has been attracting increasing attention of scientists and engineers mainly due to the involved improvement of the materials strength. Specifically, it was shown that the Hall–Petch relationship coupling the inverse of the square root of the grain size with the increasing yield strength is valid down to grain sizes as small as 10 to 25 nm. Therefore, in the range of grain sizes attainable by conventional or severe plastic deformation processes, decreasing grain size should normally lead to considerable improvement in	https://scholar.google.com/citations?user=8YPll-IAAAAJ&hl=en

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						the strength. In metal cold spray additive manufacturing (CSAM) process, extremely significant grain refinements, dislocation density increases, and strength increases have been observed in the as-built part/coating for different materials due to severe plastic deformation, extremely high strain rate, and local melting and solidification at particle-particle/particle-substrate interface. To predict the mechanical properties of the built by CSAM or similar high impact induced bonding/deposition processes under different process parameters, a novel experimentally-validated and physics-based finite element model in Eulerian framework has to be developed. The model is required to be capable to address the complexities of the CSAM processes for selected material, such as extremely large plastic deformation with plastic strain more than 10, high strain rate up to 1E8 s^-1, grain refinements from 20~100 micrometres to nano-meters, dislocation density increase, material melting-solidification, peening effects due to multiple particles impacts, etc. The supervisor in IHPC and collaborators in A*STAR can provide available experimental data on different materials built by CSAM, such as Al alloys, IN718, Ti-64 and stainless steels for validating the model. The research outcome is expected to be able to achieve scientific significance in studying the metal material behaviors and microstructural evolution under extreme conditions. I would like to collaborate with the groups which are interested in the behavior and microstructural evolution of metal material especially AM-built material under extreme conditions such as extremely high strain rate and large plastic strains. The collaborators are expected to have experimental capability on such condition, and have material science and material plasticity theory and modeling background.	
51	ZHU Huafei	Dr	Senior Research Scientist I	Institute of High Performance Computing (IHPC)	zhu_huafei@ihpc.a-star.edu.sg	1.) The research in my laboratory focuses on areas of interest including, but not limited to, the following. 1.1) Applied Cryptography (e.g., authentication, authorization, key management system, access control); 1.2) Cloud Computing leveraging Fully Homomorphic Encryptions; 1.3) Privacy-preserving Federated Learning, computing, searching and analyzing; 1.4) Making differential privacy measurable and practical; 1.5) Decentralized computing (AI, on-chain/off-chain Blockchain) leveraging secure multi-party computation 1.6) Privacy in AI 2.) I am interested in developing Privacy-preserving/Privacy-Enhancing Technologies (PPTs/PETs) that minimize data exposure and limit its purpose, while enabling a range of products and use cases. 2.1) my target is to provide secure yet practical platform supporting "Privacy-preserving Any Computing (any party, anywhere and any architecture) over Any Protected Data". Here the term "Any Computing" is very general and possibly referring to Privacy-preserving AI/Machine learning, Federated computing, IoT/Edge computing, GWAS computing, Cloud computing, Decentralized computing, on-chain/off-chain block-chain	

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						computation and Multi-party Computation. 2.2) I am focusing on developing instances of "Privacy-preserving Any Computing (any party, anywhere and any architecture) over Any Protected Data" motivated by the use-case inspired basic research (UIBR). For example, "Privacy Preserving AI over Protected Data within the Federated Learning Architecture leveraging Secure Multi-party Computation"; 3) I am interested in working with groups with available use cases and software developing resources so that the research achievements can be encoded, tested, verified and applied in the real world.	
52	Ady Suwardi	Dr	Scientist II/Deputy Head of Department	Institute of Materials Research & Engineering (IMRE)	ady_suwardi@imre.a-star.edu.sg	My research group focuses on inorganic bulk semiconductor and metals for thermoelectrics applications. This includes upcycling of silicon waste from solar cells for potential use in thermoelectric devices.	https://www.linkedin.com/in/ady-suwardi-5a498156/
53	Dan Daniel	Dr	Scientist III	Institute of Materials Research & Engineering (IMRE)	daniel@imre.a-star.edu.sg	The aim of the group is to engineer surfaces and manipulate droplets for impactful applications, ranging from anti-fouling, liquid-repellent to anti-microbial surfaces, with applications in the marine industry (to prevent marine fouling) and in the healthcare industry (to prevent disease transmissions). The droplet lab is proposing a novel platform to perform green chemistry in droplets, with the aim of reducing the environmental impact of the chemical industry and is aligned to Singapore Green Plan 2030.	https://www.dandaniel.me/
54	DONG Zhaogang	Dr	Senior Scientist I	Institute of Materials Research & Engineering (IMRE)	dongz@imre.a-star.edu.sg	The research in my laboratory focuses on sub-10-nm nanofabrication for novel and functional optoelectronic devices. Currently, we are focusing on developing miniaturized detectors and spectrometers. I would like to collaborate with groups which are interested in nanofabrication, 2D materials, perovskite, nano optics and nano photonics.	
55	Jing WU	Dr	Scientist II	Institute of Materials Research & Engineering (IMRE)	wujing@imre.a-star.edu.sg	The main aim of my group is to understand the mesoscopic transport in the nanoscale regime, ranging from electrical, thermal, thermoelectric, and excitonic transport. The transport properties arising from interactions between electrons, phonons, and photons in the low dimensional system can transform and develop novel technologies in energy, sensing, and computing applications.	https://scholar.google.com.sg/citations?user=456qPSUAAAAJ&hl
56	KAI Dan	Dr	Scientist	Institute of Materials Research & Engineering (IMRE)	kaid@imre.a-star.edu.sg	My research interests focus on 1) Biomass and lignocellulosic materials, 2) Food/Agri-waste valorization, 3) Electrospinning and nanofibers, 4) Functional biomaterials for healthcare, 5) green technology and CO2 capture	
57	LAY Chee Leng	DR	SCIENTIST	Institute of Materials Research & Engineering (IMRE)	LAY_CHEE_LENG@IMRE.A-STAR.EDU.SG	The research in my group aims to combine novel chemical syntheses, two-photon lithography and additional micro-/nano-fabrication techniques to create micro-/nano-architected materials. I am interested in exploring the combination of hierarchical design and nanoscale dimensions of different materials classes to provides a new pathway for scalable production of architected materials with advanced properties such as shape memory	

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						effects, localized surface functionalization, sensing, energy harvesting and impact absorption through architectural control. I would like to collaborate with groups which are interested in fabricating stimuli-responsive dynamic micro-/nanostructures for sensing and energy harvesting.	
58	Lin KE	Dr	Senior Research Scientist I	Institute of Materials Research & Engineering (IMRE)	karen-kl@imre.a-star.edu.sg	Determine the potential of oxide and multiferroic based spintronic THz emitters	
59	LIU Hong	Dr	Head of Nanofbrication Department/Senior Scientist II	Institute of Materials Research & Engineering (IMRE)	h-liu@imre.a-star.edu.sg	Currently my group focuses on the development of tunable metasurfaces for active control of light-matter interactions and wavefront shaping; in addition, I am also developing external stimuli responsive materials for printed micro and nano-optics for the applications of anti-counterfeiting and advanced sensing. I would like to collaborate with groups which are interested in materials development of phase change materials, external stimuli responsive paterials, nanoscale photonic materials, perovskite and 2D materials; I am also interested in the collaboration with groups which have experts in on-chip laser development, wavefront shaping, non-linear optics and ultrafast photophysics and device fabrication etc.	
60	LIU Songlin	Dr	Senior Scientist	Institute of Materials Research & Engineering (IMRE)	liusl@imre.a-star.edu.sg	I would like to collaborate with Dr Lau Cher Hon from Edinburgh University on composite membranes for Carbon Dioxide Separation in Hydrogen Production. He has expressed his interest to collaborate with me.	https://www.eng.ed.ac.uk/about/people/dr-cher-hon-lau
61	Ming LIN	Dr	senior scientist I	Institute of Materials Research & Engineering (IMRE)	m-lin@imre.a-star.edu.sg	My research focused on materials analysis and characterization, specializing in electron microscopy and spectroscopy. My research interests include the synthesis and application of carbon-based, metal-based and metal oxide-based materials and films, structural analysis at nano scale, development of new microscopic characterization technologies.	
62	Nikodem Tomczak	Dr	Senior Scientist I	Institute of Materials Research & Engineering (IMRE)	tomczakn@imre.a-star.edu.sg	Our research group focuses on the development of novel Scanning Probe Microscopy (SPM) instrumentation, tools, and methods to address key issues in tribology, sustainability, and chemical sensors industries. Atomic Force Microscopy (AFM) and Single Molecule Optical Detection (SMOD) are key tools for imaging and manipulating matter on the nanoscale based on the detection and control of light and nanoscale forces between two objects. The key challenges we want to address are the link between nanoscale materials behaviour and macroscopic phenomena in friction and adhesion, as well as the development of methods for chemical imaging on the nanoscale in liquids. We also address the need for extensive data analysis using machine learning and predictive analytics in context of a laboratory environment. Research activities: Tribology, linking nanoscale friction to macroscopic behaviour	https://www.a-star.edu.sg/imre/research-departments/advanced-characterization-and-instrumentation/advanced-nanometrology-group-(ang)

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						Viscosity and interactions between two surfaces in liquids Fabrication of novel AFM cantilevers and tips Liquid metal probes and liquid metal tribology for nanoscale contacts Cell-free study of adhesive bond formation NanoIR imaging NanoNMR – Single Spin Magnetic Resonance Imaging in liquids Machine learning and predictive analytics of AFM force-distance curves and images Polymer physics at interfaces Wetting phenomena We offer a comprehensive set of AFM and SMOD capabilities for the study of mechanical, optical, electrical, and thermal properties in air as well as in aqueous and physiologically relevant environments. Our instrumentation allows also for nanoscale mapping and correlation of structural (morphology), mechanical (adhesion, modulus, friction) and optical (lifetime, emission spectrum, polarization) properties on different length scales. CONTACT DETAILS: Dr Nikodem TOMCZAK Email: tomczakn@imre.a-star.edu.sg Phone: +65 88146540	
63	PAN Jisheng	Dr	Senior Scientist III	Institute of Materials Research & Engineering (IMRE)	js-pan@imre.a-star.edu.sg	I would like to collaborate with groups which are interested in: (1) Synthesis, characterization and application of the hybrid Perovskites thin films; (2) Tailoring 2D materials via interface engineering; (3)developing nanostructured hybrid hierarchical materials such as metallosupramolecular frameworks that combine supramolecular self-assembly with metal coordination to create novel materials.	
64	Shermin GOH	Dr	Scientist II / Group Leader	Institute of Materials Research & Engineering (IMRE)	gohsms@imre.a-star.edu.sg	The research in my laboratory focuses on functional and dynamic cross-linked polymers. We are interested in developing reprocessable thermosets, with stimuli-responsive dynamic bonds, as recyclable functional materials. Current research activities focus on developing these materials for sensors and sustainability. We welcome collaboration with groups who are interested in exploring these materials for your applications, or in developing novel recyclable materials together.	https://www.a-star.edu.sg/imre/research-departments/soft-materials/functional-dynamic-cross-linked-polymers
65	Sudhiranjan Tripathy	Dr	Senior Scientist III	Institute of Materials Research & Engineering (IMRE)	tripathy-sudhiranjan@imre.a-star.edu.sg	The research work in the group is focused on the development of GaN heteroepitaxial layers and 4H-SiC homo-epitaxial layers for high voltage electronics, using MOCVD, high temperature hotwall CVD, and related characterization and tests. The recent work aims to develop large wafer area III-Nitride based epitaxial growth on SiC, high-resistive silicon toward beyond 5G RF electronics and Sensors.	https://www.a-star.edu.sg/imre/research-departments/electronic-materials-department/wide-bandgap-semiconductors

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66	WANG Pei	Dr	Scientist III	Institute of Materials Research & Engineering (IMRE)	wangp@imre.a-star.edu.sg	We focus on metal additive manufacturing using selective laser melting and laser metal deposition processes, AM powder synthesis using metal powder spheriodization, functional alloy study using metal AM. I'm interested in developing high performance materials such as light weight steels, corrosion resistant high-entropy alloy and magnetic materials using metal AM, and sustainable metal economy to recycle, reuse and reprocess metal waste into useful products. I'd like to collaborate with groups which are interest in metallic materials development, high fiedality testing and characterization, product design and prototyping, magnetic materials, electric conductive materials, and surface coating and processing.	
67	WANG Qian	Dr	Scientist III	Institute of Materials Research & Engineering (IMRE)	wangqian@imre.a-star.edu.sg	I would like to collaborate with groups which are interested in manipulating phonon polaritons in mid-IR photonic applications; tunable photonics devices with phase change materials; quantitative phase imaging for bio-imaging and optical 3D topography.	
68	YANG Le	Dr	Emerging Group Leader, Scientist II	Institute of Materials Research & Engineering (IMRE)	yang_le@imre.a-star.edu.sg	My research group focuses on flexible and printed devices, in broadly two areas: 1) Optoelectronics and light-emissive materials/structures: mainly working with soft (organic/polymeric) materials, we fabricate optoelectronic devices, and study intrinsic photophysical properties of the materials and devices, towards building better, more efficient devices or designing useful functional structures. 2) Wearables and sensors: we build printed electrochemical sensors, currently applied in healthtech/wearable electronics. We formulate our own customised inks, print bare electrodes and functionalise them towards specific target molecules. Another highlight we have is to produce real-time traces continuously of biochemical markers.	https://www.a-star.edu.sg/imre/research-departments/soft-materials/functional-materials-for-flexible-printed-devices
69	YAO Kui	Dr	Principal Scientist II	Institute of Materials Research & Engineering (IMRE)	k-yao@imre.a-star.edu.sg	Research area and focus: (1) Nano-structured ferroics and device functional mechanisms Nanoferroics, including ferroelectric, ferroelastic, ferromagnetic and multiferroic nanostructured materials, possess a variety of extraordinary behaviors that make them extremely attractive for multi-functional device applications. Currently the project is focusing on exploration of nano-structured ferroelectrics for realization of new functional mechanisms and/or outstanding piezo-smart related performance. The ferroelectric materials' functions and properties are tailored by manipulating their composition, nanostructure, stress, and geometry. (As an example, refer to our recent publication in Science (369, 292–297, 2020).) For students with strong engineering background and interests, they are encouraged to further demonstrate advanced piezo-MEMS and NEMS (micro- and nano-electromechanical systems) devices using the obtained high performance nano-ferroelectrics. (2) Energy harvesting by functional materials with structure tailored at	https://www.linkedin.com/in/kui-yao-2575451bb/?originalSubdomain=sg

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						nanometer scales This project aims at exploring energy harvesting mechanisms in functional materials, particularly polar and ferroelectric materials. The structures of these materials are designed and tailored at molecular and nanometer scales to promote efficient generation and transportation of electrical charge carriers for achieving the desired electrical outputs. Multiple energy harvesting mechanisms exist in ferroelectric materials, including bulk photovoltaic, pyroelectric, piezoelectric, and other electromechanical effects, besides the direct electrical energy storage function with their outstanding high dielectric permittivity. Candidates with great enthusiasm about revolutionary energy sources for powering electronics and distributive intelligent systems including IoT for the future are solicited to join us. (3) Smart materials for advanced sensors and transducers Electrical polarization or the change in the polarization often occurs in response to many external stimuli in a material, particularly prominent when the structure lacks of a center of symmetry. The polarization-based stimulus-response behaviors in polar ferroelectrics lead to multiple extraordinary signal and energy conversion functions, valuable for producing competitive intelligent sensors and transducers. Combined with machine learning, these advanced sensors and transducers enabled with the polarization-crucial ferroelectric materials and functions are promising for many important fast growing applications in structural health monitoring, non-destructive testing, health care, smart city, and the intelligent manufacturing. The students will have the chance to work in a multidisciplinary team, from smart materials, advanced sensor and transducer devices, to intelligent systems with machine learning, depending on their interests and background. (4) Ultrasonic transducers; Battery-less and wireless sensors With the rapid progresses in computation capability and artificial intelligence, innovations in sensors and the ways of their implementations in the structures are required for radically upgrading various monitoring technologies with distributive intelligence as demanded in smart systems. Our team has proposed integration of ultrasonic transducers made of piezoelectric materials on the structures to be monitored. The feasibility for in-situ detection of various structural defects, including cracks, corrosions, and metallic plastic deformations, are being demonstrated using direct-write transducers and transducer array, in combination with the development of corresponding signal processing algorithm. Energy harvesting and noncontact operation solutions are under development to realize battery-less and wireless sensors as desired by the end users. The students will have the chance to work on high sensitive ultrasonic transducers, light-acoustic interactions, and/or signal transmission and processing algorithms, in collaboration with a multidisciplinary project team, depending on their interests and technical background.	

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70	Zainul Aabdin	Dr	Scientist III	Institute of Materials Research & Engineering (IMRE)	zainul_aabdin@imre.a-star.edu.sg	The research in Advanced in-situ Microscopy (AiM) group focuses on building a new metrology platform based on in-situ (scanning) transmission electron microscope (TEM/STEM) to allow the observation of liquid and gas processes at the nanoscale in real-time. Using advanced analysis techniques such as electron energy-loss spectroscopy (EELS), energy-filtered TEM (EF-TEM), energy dispersive X-Ray (EDX), (precession) electron diffraction (ED/PED), and cathodoluminescence (CL) we study the nanostructure, chemistry and optical properties of materials. We also have the expertise and capability to develop customized in-situ liquid-flow holders. Using the state-of-the-art in-situ imaging technique, we aim to develop new robust fabrication techniques such as digital-etching processes, vertical nanopillars growth which will improve the efficiency and lower the cost of future generations of microelectronic components. We are very much interested to collaborate with groups/labs which are interested in applying in-situ microscopy techniques on future technologies in the field of carbon capture (catalysis), batteries, next-generation nanoelectronics.	https://www.a-star.edu.sg/imre/research-departments/advanced-characterization-and-instrumentation/advanced-in-situ-microscopy-(aim)
71	ZHANG Zheng	Dr	Senior Scientist I	Institute of Materials Research & Engineering (IMRE)	zhangz@imre.a-star.edu.sg	My research areas include the following: 1. Surface elemental and chemical analysis by X-ray photoelectron spectroscopy (XPS); 2. Materials hardness and Young's modulus analysis by Nano-indentation; 3. Fatigue strength analysis by high-cycle fatigue test or low-cycle fatigue test; 4. Metallic coatings (Al, Ni, Ti, Cu, etc) deposition via cold spray technique and their analysis; 5. Nitride thin film deposition via reactive physical vapor deposition. I would like to collaborate with groups who are interested in the above areas.	https://scholar.google.com/citations?hl=en&user=wb6INjEAAAAJ&view_op=list_works&sortby=pubdate
72	Vinay Tergoankar	Prof	Research Director	Institute of Molecular & Cell Biology (IMCB)	vinayt@imcb.a-star.edu.sg	1) Role of RNAs and RBPs in inflammation and cancer: Tumor necrosis factor (TNF) is an important regulator of inflammation in development and physiology. Abnormal TNF signaling is a major risk factor for many human ailments ranging from rheumatoid arthritis (RA), metabolic syndrome (MS) to cancers, where inflammation is an underlying cause. Currently, the annual global cost of cancer care alone is upwards of $5 trillion. Cancers and MS are also the leading killers in Singapore. Not surprisingly, targeting TNF itself has been a therapeutic option in some of these disorders like RA. But systemic therapy targeting TNF is very costly, causes general immune suppression, and does not work for many chronic inflammatory conditions besides RA. Given TNFs pivotal role in physiology, "precision" anti-TNF drugs that work selectively, in many ailments besides RA are badly needed. However, unlike with precision oncology, several gaps in our understanding of the TNF pathway have prevented us from developing "precision anti-TNF drugs" which work in cell/context specific manner. This begs the question; have we identified and characterized all the components that regulate TNF signaling? Given that only 2% of the genome codes for proteins, and a large number of RNAs are induced during	https://www.tergaonkar-lab.com/

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						inflammation, is it possible that we have totally missed looking for RNAs as structural and regulatory components of TNF signaling? Using single cell methods, we aim to comprehensively identify, and spatially delineate the cell-type specific roles of RNAs and RBPs, hitherto undiscovered components of TNF signalling, in inflammation, development and cancer. Our studies will identify novel targets that selectively block unwanted effects of systemic anti-TNF therapy in ailments besides RA and help remodel “cold tumors” for effective immune or chemotherapy. 2) Role of RNA driven cell:cell communication in development: Tightly regulated transcription of growth factors upon activation of signalling pathways by internal and external cues is central in cellular differentiation. Although it is known that increased inflammation overturns development, whether inflammatory RNAs are important for cell-cell interactions during embryogenesis is unknown. To resolve this stimulating question, we aim to decipher the spatial and temporal dynamics of inflammatory RNAs in relation to the transcriptional state of cells during mammalian development. We will focus specifically on the endoderm-mesoderm communication as there are parallel independent observations that RNA processing may be required in this cell-cell communication. We will profile the transcriptome of single cells and use computational modelling to infer the mechanisms responsible for the transcription and editing of inflammatory RNAs. We will intersect these data with other data from spatial transcriptomics to draw a spatial-temporal post-transcriptional roadmap underlying early phases of organ formation. We will conclude by merging the function of inflammatory RNAs in a spatial-temporal model of pattern formation in development. This model will complement the already established pathways of transcriptional control of endoderm-mesoderm interaction in embryo development and will enable an improved understanding of the effect of inflammation in this context.	