Institute of Bioengineering and Nanotechnology (IBN)								
No.	**Department**	**A*STAR Supervisor's Name**	**Designation**	**Email**	**Project Title**	**Project Description**	**Degree Awarded By Upon Graduation**	**Website Link (if any)**
1	Nanomedicine	Dr. Kurisawa Motoichi	Principal Research Scientist	mkurisawa@ibn.a-star.edu.sg	1) Targeted drug delivery for treatment of diseases, 2) edible microgels for cultured meat	1) Design of the targeted drug carrier system, 2) Design of microgels for cultured meat	NUS/NTU/SUTD	
2		Dr. Yi-Yan Yang	Covering ED/ Adjunct Professor at NUS	yyyang@ibn.a-star.edu.sg	1) AI-assisted development of synthetic supramolecular assemblies as antimicrobials and antivirals to overcome multidrug resistance. 2) Biodegradable polymeric nanoparticles as non-viral carriers for targeted delivery of genes, vaccines and synthetic macromolecular therapeutics.	1) With the increased prevalence of drug resistance in microbes and the lack of new therapeutics, there is an urgent need for development of innovative antimicrobials. In this project, antimicrobial and antiviral polymers/polypeptides with unique functional mechanism will be developed and engineered to mitigate resistance development, prevent and treat multidrug-resistant (MDR) infection. AI and the state of the art analysis tools will be used to assist and accelerate discovery. In vitro and in vivo studies will be performed to evaluate toxicity and efficacy of the antimicrobials and antivirals. Moreover, students will be exposed to international collaborations, and trained by a multidisciplinary team. 2) Many of the world's diseases can be eradicated or prevented with genetic modifications or prophylaxis enhancements. Biodegradable polymeric nanoparticles can serve as gene and vaccine carriers as they possess the advantages of large cargo size and biocompatibility as compared to viral vectors. These nanoparticles can be made with well-defined compositions, size and excellent batch consistency. Targeting ligands can be chemically attached on the surface of the nanoparticles for recognition of specific cells or tissues. In this project, AI and the state of the art analysis tools will be used to assist and accelerate the discovery of nanoparticles for delivery of genetic materials (e.g. plasmid DNA, mRNA and siRNA) and vaccines (e.g. nucleic acid or protein based antigens) as well as other macromolecular therapeutics. Moreover, students will be exposed to international collaborations, and trained by a multidisciplinary team.	NUS/NTU/SUTD	

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3	Cell and Tissue Engineering	Dr. Wan Chwee Aun Andrew	Principal Research Scientist	awan@ibn.a-star.edu.sg	1) Structuring and processing of alternative proteins 2) Edible microcarriers and scaffolds for cultured meat	These projects entail the use of edible biomaterials to provide a template for protein structure and/or cell adhesion, proliferation and differentiation.	NUS/NTU/SUTD	
4	Cell and Tissue Engineering	Dr. Yu Hanry	Group Leader/ Adjunct Professor at NUS YLLSOM	hyu@ibn.a-star.edu.sg	1) Engineer human embryonic development in vitro models on chips controlled by mechanical and electrical gradients to recapitulate key steps in human embryonic development. Such precision engineered models are useful for fundamental embryology studies and compound screening for teratogen amongst environmental toxins and agrochemicals. 2) Engineer robust NASH (non-alcoholic steatohepatitis) chips with co-culture of iPS-induced Kupffer cells and liver parenchymal cells to recapitulate critical phenotypic markers for screening compounds affecting NASH progression into liver cancer. 3) Engineer Canal of Herring as in vitro human liver regeneration model for studying liver tissue morphogenesis. 4) Construct innovative biomaterials, bioreactors and ingredients to control the appearance such as colour and texture, taste and smell of cell-based meat cuts. 5) AI-based data analytics for small datasets to tackle the heterogeneity and complexity of cell/tissue based models.		NUS/NTU/SUTD	
5	Biodevices and Diagnostics	Dr. Tan Min-Han	Principal Research Scientist/Adjunct Assistant Professor at Duke-NUS GMS 2) SSHSPH, Clnical Senior Lecturer, NUS YLLSOM	mhtan@ibn.a-star.edu.sg	Circulating tumor cells as noninvasive evaluation of outcomes in cancer. Genetic determinants of outcomes of cancer therapeutics. Induced pluripotent stem cells as ex vivo toxicology models.		NUS/NTU/SUTD	
6	Green Chemistry and Energy	Dr. Zhang Yugen	Group Leader	ygzhang@ibn.a-star.edu.sg	Development of environmental benign antimicrobial technology.	The project will develop new antimicrobial materials/technologies for medtech, healthcare, argiculture and sustainable appilcations.	NUS/NTU/SUTD	

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7	Biodevices and Diagnostics	Dr. Liang Kaicheng	Team Leader/Research Scientist	liangkc@ibn.a-star.edu.sg	Minimally invasive imaging devices for real-time intra-operative cancer diagnostics.	This interdisciplinary engineering project combines advanced photonics and fiber optics, mechanical design and device prototyping, and image analytics with artificial intelligence to develop a complete medical technology platform for cellular-level microscopy of tissue in the patient, in the surgical suite, to ensure thorough cancer resections and better clinical outcomes.	NUS/NTU/SUTD	liangresearch.com
8	Biodevices and Diagnostics	Dr. Liang Kaicheng	Team Leader/Research Scientist	liangkc@ibn.a-star.edu.sg	Orthotopic tumour model induction with optical robotic guidance and real-time microscopic monitoring	Orthotopic tumour models have more realistic phenotypes than traditional subcutaneous induction, but orthotopic implantation can be technically challenging for pre-clinical technicians to perform. We will create an optically guided robotic platform for high-precision yet minimally invasive orthotopic implantation in challenging organs such as the nasopharynx, enabling the creation of novel models. These models can be longitudinally studied with minimally invasive imaging.	NUS/NTU/SUTD	liangresearch.com
9	Biodevices and Diagnostics	Dr. Liang Kaicheng	Team Leader/Research Scientist	liangkc@ibn.a-star.edu.sg	Improving yield of patient derived xenografts with multi-modality non-toxic optical characterization of tumour samples before implantation	Many cancers including nasopharyngeal cancer lack patient-derived xenograft models due to a great but poorly explained difficulty in induction. We will develop non-destructive optical imaging techniques for comprehensively assessing tumour samples before animal implantation, to derive microstructural and molecular clues predicting induction outcome.	NUS/NTU/SUTD	liangresearch.com
10	Biodevices and Diagnostics	Dr. Liang Kaicheng	Team Leader/Research Scientist	liangkc@ibn.a-star.edu.sg	Extreme miniaturization of scanning microscopy for long-term minimally invasive monitoring of spatial fluorescence maps in vivo	The ability to acquire large field of view fluorescence images from the internal aspect of tubular organs could revolutionize studies of the gut or airway, from pre-clinical investigations to clinical diagnostics. We will develop extreme miniaturization of scanning mechanisms combining sub-milimetre piezoelectric and motor actuators, with fluorescence detection to enable long-term yet minimally invasive spatial monitoring in constrained organs and keyhole surgical entrances.	NUS/NTU/SUTD	liangresearch.com
11	MEL	Dr. Cyrus Beh	Research Scientist and Team Leader	behwjc@imcb.a-star.edu.sg	Development of Materials and Methods for Bioprinting	Bioprinting is broadly described as the use of additive manufacturing approaches to create structures that can support different biological functions. Most commonly, it is envisioned as a way to create in vitro models for disease and drug interaction studies. The same cell/material constructs may also be useful for creating cultured meat. In addition to these applications, we are also interested in applying the principles of bioprinting to industrial biomanufacturing. In order to support these varied functions, novel materials and functionalization are needed to create a versatile toolkit. This project will focus on the development of suitable materials, and bioprinting approaches, that will enable the application of the technology to these areas.	NUS/NTU/SUTD	