AOE – The Institute of Molecular Technology for Drug Discovery and Synthesis

The Institute of Molecular Technology for Drug Discovery and Synthesis (IMT) has led Hong Kong to become a leading research center for drug discovery and synthesis, specialized in Metal-Based Drugs and natural products from Traditional Chinese Medicines (TCM). Compounds of gold, ruthenium, platinum and rhodium with promising anticancer activities have been created. In particular, the gold compounds with much higher potencies than the clinically-used cisplatin, gold-**1a**, gold-**2a** and gold-**3d,** show exceptionally good *in vivo* activities for killing drug-resistant cancer cells. Libraries of bioactive natural products from TCM, including saponins (Timosaponin AIII) and alkaloids (cantharimide, phthalimide and their chiral derivatives) were found to exhibit *in vitro* anticancer properties. Timosaponin AIII is also found to be an activator of autophagy. The total synthesis of the bioactive natural compounds pseudolaric acids, (±)-pallavicinolide and plakortone B, have been accomplished. *Innovative molecular technologies for drug synthesis and biosensing technologies have been developed.* A panel of novel and efficient metal-based catalysis, including ruthenium-, gold-, iron- and palladium-based catalysis, have been developed and used to create libraries of bioactive, complex and diversified organic compounds which are unique to Hong Kong. Phosphorescent metal complexes have been developed for selective and sensitive imaging of biological thiols, proteins and DNA in cells. Notable examples include luminescent platinum(II) complexes for sensitive and specific in-gel detection of TopoI-DNA complexes and G-quadruplex DNA. Innovative fluorescent beta-lactamase biosensor has been developed for rapid and sensitive screening of antibiotics. *Comprehensive infrastructures and facilities for drug discovery and synthesis have been established in Hong Kong to support the long term development of drug research.* State Key Laboratory of Synthetic Chemistry and State Key Laboratory of Chirosciences have been established in Hong Kong for research development and training of personnel. Advanced instrumentations (such as high field nuclear magnetic resonance spectrometer and high performance mass spectrometer) and high throughput drug-candidate screening platforms have also been established. *The IMT has created significant impact to Hong Kong and also to the international community in drug research.* The project successfully enhances inter-institutional and inter-disciplinary collaboration and knowledge exchange for drug research. Members of the IMT have been invited to deliver lectures in international meetings and awarded with international prestigious prizes. A total of 724 peer-reviewed articles with citations of over 10,000 times have been published. Patents have been granted by the US and Taiwan authorities. Collaborative agreements were signed with international pharmaceutical companies to co-develop our identified drug leads. Significant sponsorships from pharmaceutical companies and Innovation and Technology Fund of Hong Kong SAR have been obtained to continuously support some of our projects. To conclude, the IMT has successfully initiated drug research in Hong Kong and will boost the development of biotechnology and pharmaceutical industry in Hong Kong in the forthcoming decades.