

Areas of Excellence Scheme – Institute of Molecular Functional Materials

(AoE/P-03/08)

Layman's Summary

The Institute of Molecular Functional Materials has successfully established a world-class centre of international excellence in molecular functional materials. Through multi-institutional and multidisciplinary collaborations, the team has developed novel classes of innovative molecular functional materials to address the four grand challenges of the AoE. In the grand challenge related to New Frontiers in Supramolecular Science, the team has pioneered the use of unique non-covalent metal-metal interactions of d^8 and d^{10} metal complexes in directing the supramolecular assembly and nanostructures of molecular materials, opening up new strategies for the control of supramolecular assembly, manipulating and directing the supramolecular assembly and growth mechanisms and orchestrating the construction of well-defined molecular nanostructures and morphologies. Extensive efforts have also been devoted on the discovery of luminogenic materials with aggregation-induced emission (AIE) characteristics as well as new polymeric materials. These, together with a more thorough understanding on the nature and energy of the excited states have given important information and insights for the design of unique, more efficient and more stable triplet emitters and AIE luminogens. All these fundamental studies and understanding in supramolecular science and excited states has formed the basis to contribute towards the rational design of innovative classes of molecular functional materials to meet the other three grand challenges, including high efficiency OLED and PLED materials, OPV and OTFT materials, and catalysts for energy research. The establishment of the core laboratory facilities has provided comprehensive infrastructural facilities for molecular functional materials research in Hong Kong. Through dedication and persistence, the team has disseminated new knowledge in the form of over 930 publications in high impact peer-review journal, delivered more than 480 distinguished/plenary/keynote/award/public/invited lectures at international/national conferences, received numerous prestigious awards and election to national academies. The team has successfully built an international reputation and was invited to pre-record videos which have been broadcasted at the 2017 Materials Research Society (MRS) Spring Meeting (<https://www.youtube.com/watch?v=ddMwyEeDAyg&index=9&list=LGVe6BxyFHNWYv-kOSJWfI C9W9FEJFsHd>) as well as the 7th EuCheMS Chemistry Congress, Liverpool, 2018 (<https://www.youtube.com/watch?v=M9F3ADwAcyY>), which aim to highlight leading research centres, especially those related to energy research, and to raise the visibility of best practices in materials research. In addition, the team has also devoted enormous efforts in making contribution to local and regional economic and social development through the creation of intellectual property (IP) rights, working closely with industrial partners as well as

training of students and nurturing of scientists and next generation of academic leaders. To date, a total of 65 patent applications were filed while 12 of them have been successfully granted. A total of 100 research postgraduate students have been recruited since the commencement of the AoE in 2010 and 95 of them have graduated. Among the leaving research personnel or graduated students, 39 of them got a faculty position, including professor, associate professor, assistant professor and lecturer in universities or tertiary institutions. 12 continued to do research in universities while 20 continued to do research in private sectors. 19 have worked as professional chemists and scientists in government or private sectors. In conclusion, through bringing together multi-institutional efforts and interdisciplinary expertise, the AoE has successfully developed world-class excellence in science and technology of molecular functional materials. The AoE has brought international recognition and making Hong Kong highly visible on the map.

** The above summary is written mainly by the project team. The views expressed in the summary do not necessarily represent those of the University Grants Committee / Research Grants Council.*