

Research Assessment Exercise 2020
Impact Overview Statement

University: [City University of Hong Kong]

Unit of Assessment (UoA): [8 materials science and materials technology]

Total number of eligible staff of the university in the UoA: [22]

(1) Context

[Since 2014 we have successfully derived impact from our research in the areas of the structural materials, food safety, Energy storage, and Biodegradable materials. This has been achieved using mechanisms that are tailored to the specific sub-disciplines represented within the department. The Materials Science group in City University of Hong Kong (CityU) has grown with the University since its establishment in 1984 from naught to a world class team of staff with respectable volume of high quality research impact. CityU is the only institution in Hong Kong that has a department with “materials science” incorporated in the name. Our university was also the first in the territory to introduce undergraduate and postgraduate programs in materials science and engineering in our Department of Physics and Materials Science more than two decades ago. Four main focused research areas, namely, structural materials, functional materials, biomaterials and computational materials science, have been identified for our medium to long term development.]

(2) Approach to impact

[Our Materials Science group has a proven track record of commercialization of research, established over decades of working with industry. Our approach is to engage flexibly and creatively with external stakeholders to maximize the impact of our research. We make use of University-wide facilities to support this, with the Research Office (RO) facing towards grant providers, the Communications Office (CityU press) facing towards the public and the Knowledge Transfer Office (KTO) facing towards Industry. KTO is especially relevant for many of our impacts, as it promotes contacts with Industry, facilitates knowledge exchange, and advises on commercialisation via licensing/patenting as well as supporting spin off companies from early stage proof-of-concept onwards. It also encompasses legal services for contract negotiation with both single companies and large scale industry-academic partnerships, including MoUs and issues with Intellectual Property (IP). KTO is well-tailored to materials science requirements, in part because the Vice-President (Research and Technology) for the University (with responsibility for KTO) is a member affiliate of our Department (Prof. Jian LU). KTO accolades for business success, for its work on promoting enterprise skills both nationally and internationally over the years. KTO organizes workshop and seminars for training young graduates to become entrepreneurs. In addition, KTO also funds spin outs originate from fresh graduates with the support of TSSSU (Technology Start-up Support Scheme for Universities) program. TSSSU program is funded by ITC (Innovation Technology Commission) of Hong Kong Special Administrative Region (HKSAR) to partner with universities to commercialize products arising from research. Our department is quite successful in this initiative and have 4 spinouts through this scheme in the past 5 years]

(3) Strategy and plans

[In the relatively short history of our university (established in 1984), materials science has evolved from naught to a world class group in terms of staff quality, facilities and academic output. There has been no “pure” materials science department in any higher educational institution in Hong Kong until the establishment of our Department of Materials Science and

Engineering in 2017. Our BEng Materials Engineering and MSc Materials Technology and Management are unique programs meeting a specific community need as the Government has decided to invest in high technology with the establishment of the Science Park, the Applied Science and Technology Research Institute, Nano and Advanced Materials Institute (NAMI) and other initiatives. Materials science is a key area of research within our university. Over the past 10 years we have invested more than HK\$ 200 million (~£16m) on infrastructure to build materials characterization and testing equipment including several SEMs and TEMs, AES/SAM, XPS, UPS, AFM, STM, HREELS, LEED, PL, Raman spectrometer, X-ray diffractometers etc. The “Materials Science” cost center focus on various materials related research activities within the department by engaging faculties with strong materials science and engineering background on the design of functional materials and devices. On the other hand, faculty members in the “Materials” cost center benefit from the interactions across the department and beyond since materials science is a multidisciplinary area. With such a multidisciplinary approach, the advances in material areas spawned new ideas to their own research. This synergetic approach has been very successful, as demonstrated by a number of important papers in the area of Structural materials, bio-medical implantation, Energy materials and biodegradable materials are the strongholds of the research activities. These achievements have also led to the establishment of the following major research centers, Structural materials Laboratory, COSDAF (Center Of Super Diamond and Advanced Films), and Center for Functional Photonics, which are highly regarded in the international community. Materials engineering is a unique program to serve the needs of the Hong Kong society. Our faculty members have attracted huge number of industry sponsored research program on materials science and engineering for various applications such as orthopedic implantation, super hard thin films, batteries and sensor devices. Relevant patents have been granted and licensed on applied research. On the other hand, basic research has brought a long history of contribution to cultural enrichment, especially in public understanding of science. Going forward, the department envisions becoming a leading institution in materials science. To achieve this goal, the department organizes knowledge transfer activities around themed research. Possible topics for theme research include Materials for Energy and Health Science. Each theme research will be supported and cross-fertilized by faculties with expertise in materials synthesis, advanced characterization and computational materials science.]

(4) Relationship to case studies

[The success of the materials group in technology transfer is reflected in our selection of two Case Studies related to this area. The underpinning research related to these Case Studies pre-dates, at least in part, the introduction of formal mechanisms within the School for the support of impact related research. Nevertheless, our faculty members were supported over a sustained period by the College through prioritization of infrastructure and funds, the appointment of new staff, and the allocation of PhD studentships to foster interdisciplinary links.

We attach the following Case Studies:

- Development of portable histamine analyzer
- Manufacturing Methods and Materials for Paper-based Packaging Solutions (M3PPS)

Research driven Commercialisation: This includes the classic spin-out company model where the impact can be directly developed. One of the impact cases “Development of portable histamine analyzer” produced a spin-out company “Portalyze Point of Care Limited” employs 3 full time staff and the IP from the project has been licensed and generates royalties of 5% of sales.

Industry initiated commercialization: Departmental structures are welcoming to Industry, as evidenced by Case Study “Manufacturing Methods and Materials for Paper-based Packaging Solutions (M3PPS)” was started with an approach from industry, Ecoinno (H.K.) Limited.]