

Research Assessment Exercise 2020

Impact Overview Statement

University: Hong Kong Baptist University

Unit of Assessment (UoA): Department of Chemistry

Total number of eligible staff of the university in the UoA: 14

(1) Context -

HKBU Chemistry has created a very positive and supportive organizational ethos concerning Impact and its development. The Department works closely with the Knowledge Transfer Office to promote awareness, particularly across the (i) commercial (2 successful spin-out companies launched) and (ii) healthcare (a new approach to cancer diagnosis underway) sectors, but also in the (iii) environmental (a finding on seawater sunscreen chemical pollutants risking the human health attracting worldwide attention), (iv) societal (2 free educational mobile applications developed for chemical education and citizen science) and (v) public policy domains. Of the 14 staff, 8 have been directly involved in commercial exploitation of their research. In the licensing 9 patent families, an external income of \$2.81m has been earned over the period, mostly as a result of the works of K.L. Wong and M.S. Wong/H.W. Li. Reported by a few local and international mass media (>15), S.Y. Leung has unveiled a problematic nexus pertaining to the abnormalities in and deaths the offspring of zebrafish caused by polluting sunscreen chemicals in seawater, which can therefore pose a risk to human health. A team of HKBU analytical chemists (H.W. Li, K.K. Shiu & K.S. Ho) have contributed to two free online educational mobile applications, “Analytical Chemistry Challenge” (measured in April 2017, around 1,700 users in 120 countries had already downloaded and used this App after one month) and “ChemEye” (widely recognized and adopted by the HK government and high schools for local STEM education) as non-traditional outputs for facilitating technology-supported chemical education.

¶ https://orientaldaily.on.cc/cnt/news/20181005/00176_009.html

¶ <https://hk.news.appledaily.com/local/daily/article/20181005/20515203>

¶ <http://paper.wenweipo.com/2018/10/05/ED1810050001.htm>

(2) Approach to impact

The ethos of HKBU Chemistry is to encourage research leaders of all ages to engage with internal and external stakeholders to maximise impact across the commercial, societal, healthcare, policy and environmental sectors. Knowledge and technology transfer is promoted and supported by the University Knowledge Transfer Office (KTO) that takes responsibility for knowledge transfer development. It aims to ensure that the knowledge, know-how, technology, expertise and skills are most effectively translated, relayed and advertised beyond the University. It operates through several competitive schemes that supported HKBU Chemistry with \$5.86m over the period. The University launched a Technology Support Start-up Scheme (2014) that translates innovation and cultivates an entrepreneurial ecosystem on campus, through cash support for Intellectual Property Right development and assistance in the technology transfer process. This has provided a total of \$4.0m, supporting the HKBU companies that started in the period: New Life Medicine Technology (NLMT: K.L. Wong) and MIND and Tech Ltd (M.S. Wong and H.W. Li). In parallel, the KTO oversees a Strategic Patent Fund, where top quality first jurisdiction patent filings or 2nd/3rd jurisdictions are offered cash support (\$30k) to match the sum given by the University (\$30k) under the Innovation and Technology Fund. Each application for support is audited externally to assess its worthiness and commercial potential. In the period, HKBU Chemistry was awarded \$1.26m through this scheme, supporting 8 different research leaders. In addition, a matching proof of concept fund provides an additional scheme to support early stage IP creators, to enable them to establish proof-of-concept, identify a development path and formulate an IPR strategy to exploit ideas emanating from their primary research activities. This fund awarded a total of \$585k to enable the commercial translation of the work by H.W. Li and M.S. Wong (point of care detection of Alzheimer’s disease biomarkers), KL Wong (fast diagnostic method of prostate cancer in urine analysis) and D.L. Ma (2 examples: in situ lead ion analysis in water and ultrasensitive detection of VEGF165, a cancer biomarker, using a microfluidic luminescent probe).

The KTO supports and organises participation at international commercial exhibitions in Europe, the USA and in Asia. The participation at 13 international exhibitions and 16 more in Hong Kong supported the attendance of 7 Chemistry staff. Particular successes were won in the annual Geneva International Exhibition. In 2016, H.W. Li won the Gold Medal (surgery class) and gained a diploma of high scientific and technological inventions for work on neural stem cell harvest; in 2017, K.L. Wong won the Gold Medal (medicine) and a special medal from the Polish Academy of Sciences; in 2018, K. Ren won the Gold Award (water) for work on lead analysis, and in 2019, K.L. Wong won the Gold Medal from the International Jury and the Thailand Award for the best international invention for his prostate cancer detection kit. Finally the KTO runs an annual HKBU Innovation Award, to promote a culture of innovation and entrepreneurial activity across the university. The award was won by Chemistry staff in 2014 (Raymond Wong) and in 2018 and 2019 (K.L. Wong).]

(3) Strategy and plans

[The underlying principles for the coming research assessment exercise are:

1. to nurture and expand a culture and environment in HKBU Chemistry in which research is undertaken that provides world-leading impact across different sectors;
2. to lend support to the development and progression of partnerships with local and international businesses, research councils, non-governmental organisations, public sector bodies and spin-out companies, for mutual benefits;
3. to identify impact opportunities as they emerge in and from academic research projects and to provide support (money/time) for their fast and flexible developments.

We can already foresee that our research and enabling support from the 2013-2019 period will lead to significant economic and societal impacts by RAE-2026. In the period, 36 different patent families have been supported leading to 21 granted patents (majority are US Patents) and another 36 published. International impact is evident across a range of activities. As far as the case study is concerned, a multi-centre clinical study is in progress in which a total of 10,000 clinical urine samples will be collected in the UK, France, Australia and Japan by the end of 2020 to further expand the patient database on the prostate cancer detection project. Over 1000 prostate cancer patient urine samples have already been evaluated with the prototype, and the first commercial product will be launched on the Japanese market in February 2020.]

(4) Relationship to case studies

[The work of Prof. Ka-Leung Wong and the creation of the successful spin-out company New Life Medicine Technology – (NLMT, value US \$32m; creating 20 new jobs in the HK area) has been strongly supported and accelerated by the impact support strategy outlined here. K.L. Wong and his team identified spermine as a good urinary biomarker with >500 positive clinical prostate cancer samples, using a combination of the gold nanoparticles with spermine can diagnose prostate cancer with over 80% accuracy, at an early stage non-invasively. This project is the second product of the NLMT. In particular, this work is going to be launched as a home-based kit in the HK and Japanese market in early 2020 raising public awareness, especially for high risk prostate cancer patients. This work will benefit professionals from medical field as it acts as a supplementary method to the serum prostate specific antigen (PSA) test. Studies have shown that the incidence of prostate cancer is rising all over the world and has become the third leading cause of male cancer deaths in HK. Most patients are 50 years old or above in which many cases are diagnosed at a late stage, due to the cost of screening tests, the pain caused by the tests, and the lack of awareness in the general public. The PSA test shows poor specificity in prostate cancer diagnosis, which leads to poor accuracy and low clinical utility. Hence, many patients without prostate cancer are subjected to biopsy and thus its potential complications; many unnecessary invasive procedures are carried out including prostatectomies. Therefore, this work is likely to be used in hospitals or clinics where it is essential to include more efficient detection kits for accurate prostate cancer screening at an earlier stage for the sake of patient well-being. The public will have a higher motivation to get screened and the result can be obtained within an hour. We plan to provide services in clinics in which the urine samples are collected in the clinics and sent to our testing labs for results.]