Success Story
Scalable Manufacture of Ultra Clean NDs for Wider Industrial Use (developed by Dr Zhiqin Chu and his research team)

Event Highlights
InnoCarnival 2022
TSSSU@HKU 2023-2024

Latest Patents Filings
Progress Updates
Technology Commercialisation
Nanodiamonds, or NDs, have the potential to be used for many useful and valuable functions in science and industry. However, this potential functionality depends on first eliminating the impurities found in them. These impurities are typically ultrasmall NDs and disordered carbons, and their presence makes the NDs unusable for many purposes.

Until now, impurities have been eliminated using conventional air oxidation, but now a new salt-assisted air oxidation-SAAO-method has been invented. Combining SAAO with conventional air oxidation results in ultra clean NDs in a process that removes impurities simply, reliably and reproducibly, as well as cost effectively. This invention paves the way for NDs to be used in a broad range of industrial and biomedical applications including as drug carriers and to prevent or treat oral infections.

The new method requires an additional step, namely mixing the NDs with a specific amount of salt crystals such as sodium chloride prior to carrying out conventional oxidation. The use of SAAO results in ultra-clean NDs that emerge from the cleaning process visibly whiter in colour compared to the grey-tinged outcome that results without the use of SAAO. The new method will allow the cleaning of NDs to be scaled-up to enable them to be manufactured in large quantities and at low cost.

The invention will significantly enhance the scope of NDs for use in various scientific and industrial fields, particularly in demanding areas such as biomedical applications that require stable and sound surface functionalities. The invention has been tested in systematic microbiological studies. These studies have shown the potential for the use of ultra clean NDs in clinical application on several oral and systemically important pathogens where they have shown their ability to inhibit the formation of biofilm and to disrupt preformed biofilms.

The invention will significantly enhance the scope of NDs for use in various scientific and industrial fields, particularly in demanding areas such as biomedical applications that require stable and sound surface functionalities. The invention has been tested in systematic microbiological studies. These studies have shown the potential for the use of ultra clean NDs in clinical application on several oral and systemically important pathogens where they have shown their ability to inhibit the formation of biofilm and to disrupt preformed biofilms.

The invention was developed by Dr Zhiqin Chu, Assistant Professor, and Tongtong Zhang of the Department of Electrical and Electronic Engineering of HKU.

The invention won a silver medal at the Geneva International Exhibition of Inventions 2022 awards.

The TTO helped the team with the patent application for the invention. The TTO also chose this project for submission to the Geneva 2022 exhibition.

© The University of Hong Kong. All rights reserved.
**EVENT HIGHLIGHTS**

### InnoCarnival 2022

The nine-day "Innovation & Technology empower our dreams" carnival, organised by the Innovation and Technology Commission, runs from October 22-30 at Hong Kong Science Park. Take part in interactive and educational games, workshops and seminars and see the latest local inventions, including six from HKU at the HKU Pavilion, Booth D10. For full details and enrolment, visit https://innocarnival.hk/

**TSSSU@HKU Funding Programme**

This programme provides funding support to technology start-up companies formed by HKU members. Companies awarded under the scheme will receive a maximum amount of HK$1.5M per year for at most 3 years for TSSSU-O and 3 years for TSSSU+ respectively. Call for applications is open, with a deadline of November 15.

### TECHNOLOGY COMMERCIALISATION

**List of technologies Licensed in Aug and Sep 2022**

<table>
<thead>
<tr>
<th>Title</th>
<th>IP Types</th>
<th>PI</th>
<th>Faculty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Method of Developing a Peptide-based Vaccine Conjugated with 1V209</td>
<td>US Provisional Application No. 63/265,780</td>
<td>Prof. Jiandong Huang</td>
<td>Medicine</td>
</tr>
<tr>
<td>Anti-virus and Anti-Bacteria Stainless Steel</td>
<td>PRC Application No. 202010730748.2 0</td>
<td>Prof. Mingxin Huang</td>
<td>Engineering</td>
</tr>
</tbody>
</table>

**Top 3 revenue-booked IP in August and September 2022**

<table>
<thead>
<tr>
<th>Title</th>
<th>IP Types</th>
<th>PI</th>
<th>Faculty</th>
</tr>
</thead>
<tbody>
<tr>
<td>AI Methods to Implement Chatbot, Emotion Analyser and AR Content</td>
<td>Consultancy</td>
<td>Dr. Adela Lau</td>
<td>Science</td>
</tr>
<tr>
<td>Monitoring Vertical Wind Velocity and Turbulent Intensity Profiles</td>
<td>Tender</td>
<td>Dr. Ren Chao</td>
<td>Architecture</td>
</tr>
</tbody>
</table>
Transferring Your New Technologies into Business Opportunities

Policy Stipulation

The latest policy stipulates that the net receipts arising from the exploitation of an Invention are shared among the University, the relevant faculty/department and the inventor(s) in the ratio of 1/3 : 1/3 : 1/3. It aims to encourage the researchers at HKU not only to excel in academic performance but also to apply their technology for the benefits of mankind with an impressive reward.

How to Apply:

4 Phases for Research Projects

Phase 1: Initial Project Negotiation
1. PI will negotiate with their collaborator(s) and confirm a project proposal which includes the scope, budget and duration of the project.
2. PI will negotiate with their collaborator(s) and prepare a draft agreement (Agreement templates are available at the website of the Research Services (RS): http://www.rss.hku.hk/contracts/contractresearch/templates).

Phase 2: Endorsement from Department/Faculty
3. PI will submit the project proposal, the draft agreement, and the information form/grant application form to their department/faculty to seek an approval (The information form for research/consultancy agreements is available at: http://intraweb.hku.hk/local/rss/tto/researchor-consultancy-agreements-form.doc).
4. After obtaining the approval, PI will submit the project proposal, the draft agreement, and the information form/grant application form to the Research Service (RS).

Phase 3: Financial Legal/IP Review
5. The RS will distribute the project proposal and the draft agreement to the Finance and Enterprises Office (FEO) for financial review and to the Technology Transfer Office (TTO) for legal review.
6. If there is any financial/legal issue, the FEO/TTO will inform PI through the RS. PI will negotiate with their collaborator(s) on the financial/legal issue until it is settled.

Phase 4: Signature and Document Archiving
7. After consolidating the settled project proposal and the agreement, the RS will proceed to the signature process.
8. After duly performing the signature process, the RS will assign the RCGAS number(s) for opening the project account(s).