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Success Story

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

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TSSSU@HKU 2023-2024

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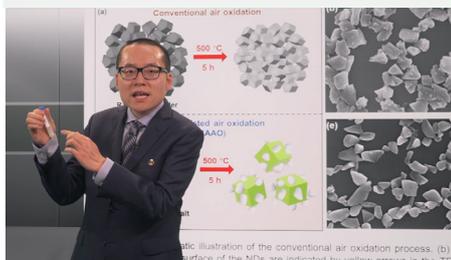
SUCCESS STORY

Scalable Manufacture of Ultra Clean NDs for Wider Industrial Use

A new invention greatly enhances the cleaning of nanodiamonds in a simple, efficient and cost-effective way, giving NDs the potential for scaled-up industrial and scientific application.

ABSTRACT

A new invention greatly enhances the cleaning of nanodiamonds in a simple, efficient and cost-effective way, giving NDs the potential for scaled-up industrial and scientific application.

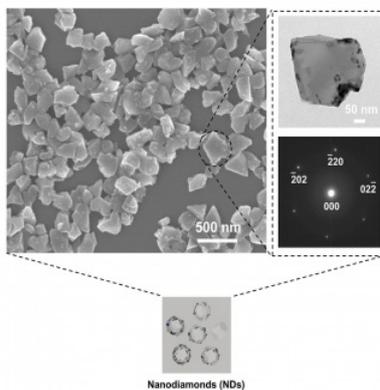


Dr Zhiqin Chu, Assistant Professor of the Department of Electrical and Electronic Engineering

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

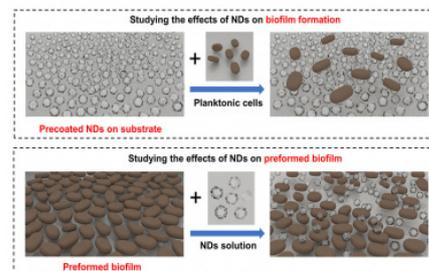
oxidation results in ultra clean NDs in a process that removes impurities simply, reliably and reproducibly, as well as cost effectively. This invention paves the way for NDs to be used in a broad range of industrial and biomedical applications including as drug carriers and to prevent or treat oral 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.



NDs work as an effective agent against both free-floating cells (planktonic cells) and attached cells (biofilm) of bacteria and fungi that are highly relevant in oral and systemic infections

The new technology 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.

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IP01105 USR Appln. No. 17/823,559 filed on 31 Aug 2022

Prof. YUEN Kwok Yung | Papain-like protease inhibitors for broad-spectrum coronaviruses inhibition

IP00861 VN-PCT Appln No. 1-2022-05613 filed on 31 Aug 2022

Prof. YUEN Kwok Yung Antibodies | Targeting Talaromyces Marneffeii Mp1p Protein and Methods of Use Thereof

IP01086 App. No. USR 17/893,276 filed on 23 Aug 2022

Dr KIM Jitae | Scalable Ultrafast Flow Synthesis of Drug Scaffolds via Aryllithium Intermediates by 3D-Printed Numbering-up Metal Microreactor Reactor

IP01180 App. No. USP 63/402,032 filed on 29 Aug 2022

Prof LIU Pengtao | Stem Cell Compositions for Culturing Coronaviruses and Methods of Making and Using Thereof

IP00900 App. No. EP-PCT 21793651.7 filed on 6 Sep 2022

Dr WANG Weiping | Nanocarriers Self-Assembled from Photoresponsive Three-Legged Molecules for Controlled Drug Release

IP00861 CN-PCT filed on 7 Sep 2022

Prof YUEN Kwok Yung | Antibodies Targeting Talaromyces Marneffeii Mp1p Protein and Methods of Use Thereof

IP00937 US-PCT 17/930,626 filed on 8 Sep 2022

Prof YUEN Kwok Yung | Compositions of Anti-Viral Peptides and Methods of Use Thereof

IP00935 USR 17/930,591 filed on 8 Sep 2022

Prof CHEN Honglin | Compositions Immunogenic Against SARS Coronavirus 2, Methods of Making, and Using Thereof

IP00861 US-PCT 17/930,919 filed on 9 Sep 2022

Prof YUEN Kwok Yung | Antibodies Targeting Talaromyces Marneffeii Mp1p Protein and Methods of Use Thereof

IP01249 PCT/CN2022/118736 filed on 14 Sep 2022
Centre for Garment Production Limited 100% | Systems and Methods for Sewing and Unwrinkling Fabrics

IP01116 USR 17/945,933 filed on 15 Sep 2022

Prof. LI Victor O.K. (EEE) | Combination of repurposed Drug Candidates for Alzheimer's Disease

IP00937 CN-PCT filed on 16 Sep 2022

Prof YUEN Kwok Yung | Compositions of Anti-Viral Peptides and Methods of Use Thereof

IP01217 USP 63/407,263 16 Sep 2022

Prof. CHE Chi-Ming | Metal-assisted Multi-resonance Thermally-Activated Delayed-Fluorescence Emitters for OLED Applications

IP00920 CN-PCT filed on 21 Sep 2022

Dr SETO Wai Kay Walter | DA-BD-LSTM-Dense-UNet for Liver Lesion Segmentation

IP01243 USP 63/376,915 filed on 23 Sep 2022

Prof. Anderson SHUM | All-Liquid Triboelectric Nanogenerator for Harvesting Distributed Energy

IP01210 USP 63/376,831 filed on 23 Sep 2022

Dr. Kelvin TO | Compositions for Coronavirus Detection and Methods of Making and Using Thereof

IP01272 USP 63/410,363 filed on 27 Sep 2022

Prof. TSIA Kevin | Parallelized Circularly-Arrayed Platform for High-Speed Cell Imaging

IP01267 USP 63/410,291 filed on 27 Sep 2022

Prof. TSIA Kevin | Batch Effect Correction on Biological Images with Deep Generative Learning

IP01266 USP 63/410,289 filed on 27 Sep 2022

Prof. TSIA Kevin | Automated Interpretable and Generalizable Biological Morphological Profiling

IP01125 USR 17/936,179 filed on 28 Sep 2022

Prof. SHEN Jiangang | 23-O-Acetylalisol B As Novel Therapeutic Agent for Coronavirus Induced Severe Acute Respiratory Syndrome Through Broadly Inhibiting Coronavirus and Immunomodulation

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

Title	IP Types	PI	Faculty
Method of Developing a Peptide-based Vaccine Conjugated with 1V209	US Provisional Application No. 63/265,780	Prof. Jiandong Huang	Medicine
PD1-Based Vaccination Composition and Methods Thereof	US Patent No. 9,029,315; Chinese Patent No. ZL201180054073.3; EP Patent No. 2638061; EP Patent No. 2910572; PCT Provisional Application No. PCT/CN2021/075254 (filed in AU, JP, US and CA)	Prof. Zhiwei Chen	Medicine
Anti-virus and Anti-Bacteria Stainless Steel	PRC Application No. 202010730748.2 0 PCT Application No. PCT/CN2021/130229 HK Application No. 42022054306.0	Prof. Mingxin Huang	Engineering

Top 3 revenue-booked IP in August and September 2022

Title	IP Types	PI	Faculty
AI Methods to Implement Chatbot, Emotion Analyser and AR Content	Consultancy	Dr. Adela Lau	Science
PD1-Based Vaccination Composition and Methods Thereof	US Patent No. 9,029,315; Chinese Patent No. ZL201180054073.3; EP Patent No. 2638061; EP Patent No. 2910572; PCT Provisional Application No. PCT/CN2021/075254 (filed in AU, JP, US and CA)	Prof. Zhiwei Chen	Medicine
Monitoring Vertical Wind Velocity and Turbulent Intensity Profiles	Tender	Dr. Ren Chao	Architecture

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)

ABOUT US

About HKUTTO

The Technology Transfer Office (TTO) is committed to maximising the impact of research through technology transfer at both the institutional and industrial levels. TTO works closely with researchers at HKU to commercialise their inventions through professional consultation on business development, legal advice and assistance, as well as patent application filings. Your inventions will not benefit society unless they are mass produced.

About Versitech

Versitech Limited is the commercial arm of HKU. Versitech negotiates, executes and manages commercial business contracts and agreements on behalf of the University.

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