THE HONG KONG POLYTECHNIC UNIVERSITY
香港理工大學

Press Release
新聞稿

Appendix

PolyU's winning projects at Silicon Valley International Inventions Festival

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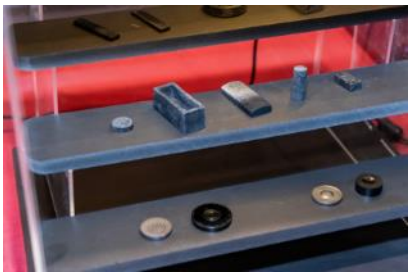
Project description	Principal Investigator(s)	Award(s)
ICU-grade Wireless Breathable Cardiac Electronic Skin   This innovation offers a seamless and non-invasive electrocardiogram experience. It ensures continuous, comfortable and inflammation-free heart monitoring with accuracy as high as achieved in intensive care units (ICU), but without traditional wired and bulky clinical devices. It has been adopted for early detection of heart disease in daily life and in outpatient clinics, while also being suitable for monitoring ICU patients both during and after surgery. The wearable cardiac electronic system is ultrathin and ultralightweight with a thickness of only 181 μm and weight of 0.489g. It is highly stretchable and permeable, and of a high-integration-density. It also allows real-time acquisition, analysis and wireless transmission of cardiac data via a smartphone.	**Prof. ZHENG Zijian** Chair Professor of Soft Materials and Devices, Department of Applied Biology and Chemical Technology of PolyU; Associate Director, Research Institute for Intelligent Wearable Systems, and University Research Facility in Materials Characterisation and Device Fabrication	Semi-Grand Prize Gold Medal
Development of Intelligent Nighttime Brace with Smart Padding to Treat Adolescent Idiopathic Scoliosis	**Prof. Joanne YIP** Associate Dean (Industrial Partnership); Professor, School of	Prize of the Korea Invention Promotion

  This innovation introduces an intelligent nighttime brace for Adolescent Idiopathic Scoliosis (AIS) patients with a Cobb's angle of 10 to 25 degrees, using soft robotics and smart padding. Integrating clinical research, material science and wearable technology, the brace features a smart system that automatically adjusts corrective forces and positioning, ensuring optimal spinal correction. Covered with sweat-wicking and breathable textiles and equipped with an air-bag support belt for additional tractive forces, the brace promises comfort and efficiency. Real-time sensors monitor body-brace contact and sleeping posture, allowing dynamic adjustments to wearer movements to enhance correction effectiveness and minimise discomfort. This invention offers personalised treatment, improved patient compliance due to increased comfort and reduced risk of skin issues, potentially improving the quality of life for AIS patients. Ongoing clinical trials aim to optimise this innovative brace, highlighting our commitment to advancing scoliosis management.	Fashion and Textiles of PolyU **Prof. Raymond TONG** Professor, Department of Biomedical Engineering, The Chinese University of Hong Kong **Prof. Kenneth M.C. CHEUNG** Jessie Ho Professor in Spine Surgery, Chair Professor, The University of Hong Kong; Hospital Chief Executive, The University of Hong Kong - Shenzhen Hospital	Association Gold Medal
3D-Printed Triply Periodic Minimal Surface (TPMS) Bone Scaffolds	**Prof. ZHAO Xin** Professor, Department of Applied Biology and Chemical Technology of PolyU; Founder, ReNew Biotechnology	Prize of the Croatian Union of Innovators Silver Medal

  The 3D-printed triply periodic minimal surface (TPMS) bone scaffolds use β-tricalcium phosphate with a hyperboloidal shape that mimics trabecular bone. The scaffolds are highly porous and interconnected, which helps reduce stress and increases their strength. They can support the adhesion and proliferation of human mesenchymal stem cells and promote the transformation of these cells into bone cells to support the formation of blood vessels, a process known as "osteogenesis-angiogenesis coupling". This is achieved by the shape of scaffold which reorganises the cell's internal structure, with focal adhesion kinase and mitogen activated protein kinase pathway activation. In-vivo evaluation demonstrates that TPMS scaffolds boost new bone formation and blood vessel growth. The scaffolds guide the development of bone and blood vessel cells using only their physical properties and demonstrate substantial improvements in bone regeneration without any additional substances. They pave the way towards a simple, safe, efficient and personalised bone graft solution with very significant potential for clinical use.	Limited (a PolyU academic-led startup)	

Thick Glassy Carbon Manufacturing and Physical Property Adjustment through Heat Treatment   Glassy carbon, a non-graphitised carbon material with excellent physical and chemical properties, is suitable for a variety of applications including glass moulding and semiconductor manufacturing. However, size limitations, high preparation costs and its hardness make conventional glassy carbon difficult to process. In response to these challenges, the team has developed an innovative solution to create large, customisable shapes of glassy carbon products in a cost-effective manner. The team has also developed a subsequent heat treatment that finely adjusts the material's physical properties. This innovation not only broadens the potential applications of glassy carbon but also prolongs its service life.	**Mr YANG Yi** PhD Student, Department of Mechanical Engineering of PolyU; Founder, Discarbonery Technology Limited (a PolyU startup)	Gold Medal
Edge AI-empowered Smart Devices and Robotics for AIoT Applications   Edge AI is an innovative technology that combines computing and artificial intelligence to enable real-time data processing and intelligent decision-making on Internet of Things devices and robots. This edge AI platform employs various resource-aware scheduling algorithms to support	**Prof. CAO Jiannong** Dean, PolyU Graduate School; Otto Poon Charitable Foundation Professor in Data Science; Chair Professor of Distributed and Mobile Computing; Director, Research Institute for Artificial Intelligence of Things, and University	Gold Medal

faster and collaborative model training and inference. It also comprises an edge-native task scheduling system to manage large-scale, geographically distributed and heterogeneous edge resources. Additionally, easy-to-use application programming interfaces are embedded in the model to streamline the development of edge-native AI applications. The team has also adopted edge AI in developing a real-time pipeline defect detection robot. Its deformable design and autonomous control enable the robot to operate effectively in challenging environments, such as on multiple structures underground or underwater pipelines.	Research Facility in Big Data Analytics	
MicroFish: A Lab-on-a-chip for On-site Detection of Microbial Contamination and Pollutants   MicroFish is a palm-sized lab-on-a-chip device that can detect microbial pathogens and environmental pollutants. It is easy to operate by injecting samples into the lab-on-a-chip, which contains colorimetric chemical sensors, and then analysing the positive or negative result. It allows for rapid, low-cost on-site monitoring of potential microbial outbreaks in aquacultures and livestock farms with limited access to diagnostic laboratories. The result is early detection of microbial pathogens or pollutants, enabling prompt responses to potential outbreaks of disease or environmental pollution. This innovation will reduce livestock mortality, thereby helping to prevent serious economic losses and will contribute to food security. This project supports UN Sustainable Development Goals, including Life Below Water, and Clean Water and Sanitation.	**Dr CHUA Song Lin** Assistant Professor, Department of Applied Biology and Chemical Technology of PolyU; Co-founder, Microfish Limited (a PolyU academic-led startup) **Dr LIU Yang Sylvia** GBA Startup Postdoctoral Fellow, Department of Applied Biology and Chemical Technology of PolyU; Co-founder, Microfish Limited (a PolyU academic-led startup) **Dr KHOO Bee Luan** Assistant Professor, Department of Biomedical Engineering, City University of Hong Kong	Gold Medal