Attachment 2:

Funding Scheme for Scientific Research and Innovation Application Guidelines for Projects Type C "Application Development Category" (2023)

I.   Background

To properly support the policy address of the SAR government, encourage the output of application-oriented scientific research achievements and enhance the contribution of scientific and technological innovation to Macao's social and economic development, the Science and Technology Development Fund (FDCT) has taken into account the professional opinions of the Project Advisory Committee to analyze previously-funded projects and selected a number of directions with research foundation and application prospects for mainly application by the scientific research teams of Macao's universities. It is expected to promote the formation of application-oriented scientific research achievements by strengthening application orientation.

II.   Overall Objective

To strengthen the support for directions with research foundation and application prospects to promote R&D further to the next stage, enhance industry-university-research partnership, and accelerate the output of application-oriented scientific research achievements, so as to support the moderate and diversified development of Macao's economy.

III.   Research Directions

(I) Biomedicine

Direction 1: TCR-T Cell Therapy for Common Tumors in Macao
Research Objective: Make a breakthrough in the key technologies of TCR-T antitumor immune-cell therapy and apply it to a common tumor in Macao.
Research Content:

Complete the design and preparation of regimens of TCR-T cell therapy for common tumors (such as liver cancer, breast cancer and lung cancer) in Macao and formulation of quality control standards; complete animal-level experimental verification and all preclinical studies to meet the requirements of clinical study application.
Research period: 36 months

Direction 2: Application of Artificial Intelligence in R&D of TCM

Research Objective: Make a breakthrough in the key technologies of artificial intelligence in the R&D of TCM and apply it to the R&D of TCM for chronic diseases in the elderly.

Research Content:

For chronic diseases in the elderly, study the application of artificial intelligence technology in the R&D of TCM, including machine learning prediction, optimization of pharmaceutical formulation, and deep learning for pharmacodynamic analysis to improve the development efficiency of new drugs and form a valuable AI-assisted TCM R&D system.

Research period: 36 months

(II) Information Technology

Direction 1: Research on Credibility of Smart System

Research Objective: For scenarios such as industry, energy, health, communication, and network, overcome key problems in the implementation and application of the system, especially credibility issues, and realize system demonstration.

Research Content (any of the following):

(1) Develop key technical algorithms and systems for detection, diagnosis, treatment or rehabilitation based on the characteristics of medical applications to improve their reliability, robustness, safety, privacy and explainability, and evaluate the developed system in real-world scenarios.

(2) Develop new sensors or displays for applications in industry, energy, health, communication, network, and more with emphasis on reliability, robustness, security, privacy and explainability of information acquisition, processing and display, and evaluate the developed system in real-world scenarios.

(3) For applications in industry, energy, health, communication, network, and more, study key integrated circuit design technologies, complete high-performance low-power integrated circuits and systems, improve the technological innovation and functions of

circuits and systems, highlight the completeness, reliability, and low-power consumption of circuits and systems, and evaluate the designed integrated circuits and systems in real-world scenarios.
Research period: 36 months

Direction 2: Key Technologies of Data, Communication and Network
Research Objective: Carry out research on relevant key technologies for the key problems of data, communication and network in practical application, and realize system application verification.
Research Content (any of the following):
(1) For application scenarios that rely on communication and network, such as autonomous driving, Internet of Things and multimedia, carry out research on theories and technologies such as protocol, signal processing, identity authentication, information security, energy conservation and service quality to realize system verification in the selected application scenarios.
(2) For relevant application scenarios of smart cities, develop new methods and algorithms for group perception, big data processing, and intelligent multi-objective decision-making (MODM), carry out research on theories and technologies such as artificial intelligence, blockchain and digital space, and realize system verification in related application scenarios.
Research period: 36 months

(III) Engineering and Materials

Direction 1: Perovskite Materials and Device Applications
Research Objective: Make a breakthrough in the key generic technologies of perovskite materials in PV, luminescence and display applications to realize the application demonstration of perovskite PV cells and light-emitting display devices.
Research Content:
Through the research on perovskite hydridization structure, interface regulation mechanism and photoetching, develop key technologies such as low-cost large-area perovskite thin films and PV modules and preparation of light emitting display devices to realize the application of new perovskite in new energy sources and light emitting devices.
Research period: 36 months

Direction 2: New Battery Materials and Applications
Research Objective: Promote the R&D of advanced ion battery

technology and equipment, make a breakthrough in the key generic technologies such as wearable devices, and realize application demonstration.

Research Content (any of the following):

(1) Conduct application demonstration for the research on materials and energy storage mechanism and technology of new ion batteries (such as sodium, zinc and potassium) and flow redox cells.

(2) Develop materials and devices related to flexible cells and sensors to meet the requirements of new wearable devices, and demonstrate their applications in real-world scenarios.

Research period: 36 months