

附件：2026-2028 臺日(JST)共同研究計畫合作領域英文說明

1. New Scheme for Joint Funding of Japan-Taiwan Research Cooperation

Japan Science and Technology Agency (JST) and the National Science and Technology Council (NSTC) have initiated a program for joint funding of Japan-Taiwan cooperative research projects. After consultation between JST and NSTC, "Nanoelectronics and System Integration for AI" was selected as the field of research to which the joint funding scheme is applied.

2. Aim of Program

The aim of the program is to strengthen collaboration between Japan and Taiwan within the field of "Nanoelectronics and System Integration for AI" to achieve world-class scientific results, leading towards new innovative science and technology.

Since Japan and Taiwan have different strengths in nanoelectronics, development of innovative nanoelectronics for AI applications is expected by conducting research while making use of the strengths of both Japan and Taiwan. In consideration of the above, JST and NSTC co-organized joint workshops (<https://www.jst.go.jp/inter/program/kiban/gather/taiwan.html>) in Kyoto (June 2019) and in Tainan (December 2022) to investigate cooperative research areas which are thought to have potential for collaboration between Japan and Taiwan researchers. Based on the outcome of the workshop, "Nanoelectronics and System Integration for AI" was jointly agreed upon as the field of the joint call in 2019, 2021, and 2023. A total of eleven teams were selected for the joint calls. This year, the fourth joint call is announced under the same scheme.

3. Research Field

AI technologies quickly become a world leading research area for modern smart living technologies. Currently, the most application systems are based on graphics processing units (GPU) under the control of computers, which could involve heavy loading of memory access and computation kernel. For low power, fast, and versatile AI systems, researchers start to design the AI processors with concept of computation in memory (CIM) and near memory computing. In the future, neuromorphic computing or brain-inspired computing should be also deeply investigated. The possible cooperated topics that would

benefit both Japan and Taiwan were discussed to finalize the priority research area for the 4th Joint Call for Proposals.

The priority research area / topics are listed below. In each of the 1st and 2nd calls, three projects were selected based on competition among more than ten applicants, and all of them are dealing with new materials for logic/memory devices. In the 3rd call, five projects were selected, and all of them are dealing with utilization of AI for healthcare applications. This year, we welcome proposals complementary to the ongoing subjects, such as novel design and technologies for AI computing systems that connect AI systems and new applications while reducing energy consumption, although possible proposals are not limited to these subjects and those on materials/devices for accelerating AI applications are still appreciated.

The priority research area / topics are:

1) Innovative electronics devices and systems to enable advanced AI applications

AI learning and inference systems require significant computing power and consume energy as well. Disruptive proposals are requested that enable efficient data processing for AI with minimum power consumption. Examples are near memory or in-memory computing using novel processing units or memory devices. Another example is neuromorphic or brain-inspired computing based on new operation principles. Proposals on quantum computing hardware are also welcome, provided they have a clear scope to meet specific AI applications.

2) Innovative power devices for AI systems or AI-driven power device innovation

The energy efficiency of AI systems may be greatly enhanced through the adoption of innovative power devices. Such devices may be implemented to supply electricity to entire AI systems or be integrated directly into AI devices. Conversely, AI-driven intelligent control can be leveraged to enhance the capabilities of power devices, optimizing their performance and efficiency.

3) Innovative optical devices for AI systems or AI-driven optical devices innovation

The AI system relies on input and output of huge amounts of data, which can be greatly optimized through innovative optical devices. The AI operation itself can be executed using optical devices with low energy consumption. Conversely, AI-assisted intelligent control can be employed to improve the performance and functionality of optical devices.

4) Innovative AI devices and systems for climate science

In response to the multifaceted challenges posed by global climate change, the goal of achieving net-zero emissions by 2050 undoubtedly requires advanced AI-driven solutions, which in turn rely on innovative devices and systems. We seek proposals for AI devices and systems that contribute to climate science, such as AI-powered analysis of ocean dynamics and their impacts on climate change.