

Researcher Position in Science of 2.5 Dimensional Materials

2.5 Dimensional Materials, a collaboration research project supported by MEXT Grant-in-Aid for Transformative Research Areas, is seeking for six post-doctoral fellows (or specially appointed assistant professors) who will be responsible for promoting research in the field. The purpose of the project **2.5 Dimensional Materials** is to develop the materials science by combining a wide variety of 2D materials and utilizing interlayer nanospaces.

Web page: <https://25d-materials.jp>

1. Position and Job Description

A01 Ago group, Global Innovation Center (GIC), Kyushu University (PI: Prof. Hiroki Ago)

Project name: Synthesis of 2.5D materials based on CVD growth and intercalation

Job description: Development of novel science of 2.5D materials based on CVD growth of high-quality graphene, h-BN, and TMDC, molecular intercalation in their interlayer space, and electronic applications of the 2.5D materials. Candidates are expected to contribute to our area, "Science of 2.5 Dimensional Materials" through the sample supply and close collaboration with other members in this project.

Position: Postdoctoral fellow (Full time) or Specially Appointed Assistant Professor (Full time)

Number of positions: 1

A02-1 Miyata group, Department of Physics, Graduate School of Science, Tokyo Metropolitan University (PI: Prof. Yasumitsu Miyata)

Project name: Fabrication and characterization of 2.5 dimensional integrated structures

Job description: Studies on growth, transfer, electrical/optical characterizations, and device applications of 2D materials including transition metal dichalcogenides. Candidates are expected to contribute to the progress of the "Science of 2.5 Dimensional Materials" project through collaboration with experimental and theoretical groups in the project team.

Position: Specially Appointed Researcher (Full time) or Specially Appointed Assistant Professor (Full time)

Number of positions: 1

A02-2 Machida group, Institute of Industrial Science, the University of Tokyo (PI: Prof. Tomoki Machida)

Project name: Fabrication of van der Waals 2.5-dimensional materials

Job description: Fabrication of van der Waals junctions of 2D materials. Candidates are expected to contribute to the fabrication of van der Waals junctions of 2D materials for the progress of the "Science of 2.5 Dimensional Materials" project and support research collaboration with experimental groups as a technical staff in "Collaboration facilities for 2.5D materials".

Position: Technician (Full time), Specially Appointed Researcher (Full time), or Specially Appointed Research Associate (Full time).

Number of positions: 1

A03 Suenaga group, Sanken, Osaka University (PI: Prof. Kazu Suenaga)

Project name: Advanced Electron Microscopy of 2.5D Materials

Job description: Development of analytical techniques of 2.5 hetero structures. Especially atomic resolution microscopy and high-resolution electron spectroscopy will be used to diagnose novel 2.5D materials. Candidates are expected to contribute to the progress of the "Science of 2.5 Dimensional Materials" project through collaboration with experimental and theoretical groups in the project team.

Position: Specially Appointed Researcher (Full time) or Specially Appointed Assistant Professor (Full time)

Number of positions: 1

A04-1 Koshino group, Department of Physics, Graduate School of Science, Osaka University (PI: Prof. Mikito Koshino)

Project name: Theoretical study on moiré materials and quasicrystals based on 2D materials

Job description: Development of theory of moiré materials and quasiperiodic systems and exploration of the novel physical properties. Candidates are expected to contribute to the progress of the "Science of 2.5 Dimensional Materials" project through collaboration with experimental and theoretical groups in the project team.

Position: Specially Appointed Researcher (Full time) or Specially Appointed Assistant Professor (Full time)

Number of positions: 1

Detailed information:

[https://www.sci.osaka-u.ac.jp/sci_table/e/upfile/pdf/20210009/DepartmentofPhysicsResearcher\(Full-time\)orAssistantProfessor\(Full-Time\).pdf](https://www.sci.osaka-u.ac.jp/sci_table/e/upfile/pdf/20210009/DepartmentofPhysicsResearcher(Full-time)orAssistantProfessor(Full-Time).pdf)

A04-2 Sasagawa group, Laboratory for Materials and Structures, Tokyo Institute of Technology (PI: Prof. Takao Sasagawa)

Project name: Exploring novel quantum properties of 2.5-dimensional materials, approaching from

three dimensions

Job description: The successful candidate will develop single crystals of a wide variety of vdW stacked materials and utilize them to explore novel quantum properties such as topological electronic states and unconventional superconductivity through their 2.5D structuring. Candidates are expected to contribute to the progress of the "Science of 2.5 Dimensional Materials" project through collaboration with experimental and theoretical groups in the project team.

Position: Technical Assistant (Full time/Part time) or Specially Appointed Researcher (Full time)

Number of positions: 1

2. Qualifications

Applicants must have a doctoral degree (or expected to have by the starting date).

3. Starting Date

April 1st, 2022 (or as soon as possible thereafter)

4. Term of employment

From the starting date to March 31st, 2023.

(The contract may be extended subject to evaluation. The extension limit will be March 31st, 2026 on which the project ends.)

5. Salary and Benefits

According to the regulations of the research institution.

6. Application Documents

Applications must be written in English or Japanese and include the following:

- (i) A Curriculum Vitae (photo attached)
- (ii) An outline of research achievements (within two A4 pages)
- (iii) Reprints of major original papers (within 3)
- (iv) A list of research achievements (original papers, review/tutorial papers, books, presentations in international/domestic conferences, awards, prizes and research funding)
- (v) Research plan (within two A4 pages)
- (vi) Name, affiliation, and contact information of at least two professional references who are willing to be contacted about the applicant

7. Application Deadline

A01, A02-1, A02-2, A04-1, A04-2 : January 31st, 2022, or until the position is filled.

A03 : March 31st, 2022, or until the position is filled.

8. Sending Address and Contact Information

Applicants must submit a single zip file including the above materials to the e-mail address of the corresponding researcher (below) by the deadline. The title of the email must be "Researcher position in 2.5 Dimensional Materials".

A01: Hiroki Ago, Global Innovation Center, Kyushu University

h-ago@gic.kyushu-u.ac.jp

A02-1: Yasumitsu Miyata, Tokyo Metropolitan University

miyata-yasumitsu@tmu.ac.jp

A02-2: Tomoki Machida, Institute of Industrial Science, the University of Tokyo

tmachida@iis.u-tokyo.ac.jp

A03: Kazu Suenaga, Sanken, Osaka University

ksuenaga.aist@gmail.com

A04-1: Mikito Koshino, Osaka University

koshino@phys.sci.osaka-u.ac.jp

A04-2: Takao Sasagawa, Tokyo Institute of Technology

sasagawa.t.aa@m.titech.ac.jp

8. About the project

Grant-in-Aid for Transformative Research Areas (A)

“Science of 2.5 Dimensional Materials: Paradigm Shift of Materials Science Toward Future Social Innovation”

<https://25d-materials.jp>

Materials science has established the basis of our modern society through the development of emergent internet of things (IoT) technologies. Traditional materials science is mainly based on the precise control of bulk materials with rigid chemical bonds. On the other hand, two-dimensional (2D) materials, such as graphene, offer novel ways to make new materials by integrating different layers via van der Waals interaction. This is accomplished by artificial stacking of 2D materials with controlled compositions and stacking angles, an approach that is expected to significantly expand the

frontier of materials science. Furthermore, well-defined 2D nanospace existing between the layers of stacked 2D materials offer the opportunity to explore novel phenomena and to synthesize new materials.

In this research area we propose to explore the "Science of 2.5 dimensional materials" by introducing the new concepts "freedom of integration" and "2D nanospace", in combination with the synthesis of a wide variety of 2D materials. We will develop academic research based on this unique "2.5D" concept to achieve world-leading results, giving rise to upcoming social innovation. This research area consists of five research groups (A01~A05), and all the members in this area collaborate closely to establish the new scientific field. In addition, the collaborations are supported by the four joint research centers of the groups, allowing access to a wide range of facilities, such as automatic stacking equipment.

