

Quantum Materials Science Unit (Yoshinori Okada)

FY2018 Annual Report]

Quantum Materials Science Unit

Yoshinori Okada (Assistant Professor)



Abstract

FY2018 is almost the first FY for our unit. The main activity in this FY started with setting up the crystal growth. In the latter half of FY2018, we succeeded to grow various magnetic quantum materials, including bulk single crystals of van der Waals coupled rare earth compounds and epitaxial magnetic thin films of transition metal chalcogenides.

1. Member

1.1 Staff

- Dr. Yuita Fujisawa, (PD)

1.2 Rotation Student

- Mr. Mohamed Atwa
- Mr. Xing Zhu

- Mr. Barnaby Smith
- Ms. Anjana Krishnadas

1.3 Research interns/Visiting Scientists

- Prof. Riki Kobayashi (Ryukyu university, Japan)
- Mr. Shingo Kuniyoshi (Ryukyu university, Japan)

2. Collaborations

2.1 First Principle Calculations

- Prof. Feng-Chuan Chuang (National Sun Yat-sen University, Taiwan)
- Dr. Hsin Lin (Academia Sinica, Taiwan)

2.2 Low temperature Experiments

- Prof. T. Kawae (Kyushu University, Japan)
- Prof. Y. Yoshida (Kanazawa University, Japan)
- Prof. M. Ohashi (Kanazawa University, Japan)
- Prof. T. Masuda (The University of Tokyo, Japan)

2.3 Device fabrication

- Prof. Y. Niimi (Osaka University, Japan)

3. Activities and Findings

3.1 Materials growth facility setting up

Flux growth, chemical vapor transport, and epitaxial thin film growth facilities were installed. For epitaxial thin film growth, pulsed laser deposition method and molecular beam epitaxy facilities were set up. We mainly optimized growth condition of various 2D rare-earth and transition metal compounds.

4. Publications

4.1 Journals

1. Disorder induces power-law gaps in an Insulator-Metal Mott transition
Z. Wang, Y. Okada et al.,
PNAS 115, 11198 (2018)
2. Two distinct surface termination of SrVO₃ (001) ultrathin films as an influential factor on metallicity
H. Oka, Y. Okada et al.,
Appl. Phys. Lett. 113, 171601 (2018).
3. Anisotropic Band Splitting in Monolayer NbSe₂: Implications for Superconductivity and Charge Density Wave
Y. Nakata, Y. Okada et al.,
npj 2D Materials and Applications 2, 12 (2018)
4. Atomic-scale visualization of oxide thin-film surfaces
K. Iwaya and Y. Okada et al.,
Sci. Technol. Adv mater. 19(1): 282-290 (2018)

4.2 Books and other one-time publications

Nothing to report

4.3 Oral and Poster Presentations

1. Investigation of physical properties of Cr chalcogenide thin films
Y. Fujisawa, S. kuniyoshi, R. kobayashi, Y. Okada
Physical Society of Japan, fall meeting (2018)
2. Investigation of physical properties of layered lanthanoide- chalcogenide single crystals
S. Kuniyoshi, Y. Fujisawa, D. Ueta, T. Masuda, R. Kobayashi, Y. Okada
Physical Society of Japan, fall meeting (2018)

5. Intellectual Property Rights and Other Specific Achievements

Nothing to report

6. Meetings and Events

Nothing to report

7. Other

Nothing to report.