

Masaki Uchida

Affiliation: Department of Applied Physics / Quantum-Phase Electronics Center, the University of Tokyo

Position: Lecturer

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Research Interests:

oxide thin films, molecular beam epitaxy, topological transport, strongly correlated materials, photoemission spectroscopy

Research Experience:

2018.10-present PRESTO Researcher, JST (supervised by Prof. Shuichi Murakami)

2018.7-present Lecturer, the University of Tokyo

2013.9-2018.6 Research Associate, the University of Tokyo

2012.4-2013.8 JSPS Postdoctoral Fellow for Research Abroad (Shen Lab., Cornell University)

2009.4-2012.3 JSPS Research Fellow (DC1) (Tokura Lab., the University of Tokyo)

Educational Qualification:

2009.4-2012.3 Ph. D. in Applied Physics, the University of Tokyo (supervised by Prof. Yoshinori Tokura)

2007.4-2009.3 M. S. in Applied Physics, the University of Tokyo (supervised by Prof. Yoshinori Tokura)

2003.4-2007.3 B. S. in Applied Physics, Kyoto University (supervised by Prof. Isao Tanaka)

Publications: (As of February 2019: 48 total publications, 1000+ citations, *h*-index = 18)

Review Articles

[2] “Topological Properties and Functionalities in Oxide Thin Films and Interfaces” **M. Uchida** and M. Kawasaki, *Journal of Physics D: Applied Physics* **51**, 143001 (2018).

[1] “Topological Oxide Electronics” in “The 2016 Oxide Electronic Materials and Oxide Interfaces Roadmap” **M. Uchida** and M. Kawasaki, *Journal of Physics D: Applied Physics* **49**, 433001 (2016).

Books

[1] “Spectroscopic Study on Charge-Spin-Orbital Coupled Phenomena in Mott-Transition Oxides” **M. Uchida** ISBN: 978-4-431-54296-4 (Springer-Verlag, 2013).

Original Papers

[45] “Ferroelectric field control of charge density in oxide films with polarization reversal by electric double layer” R. Nishino, Y. Kozuka, F. Kagawa, **M. Uchida**, M. Kawasaki, *Applied Physics Letters* **113**, 143501 (2018).

[44] “Signatures of charge-order correlations in transport properties of electron-doped cuprate superconductors” H. Matsuoka, M. Nakano, **M. Uchida**, M. Kawasaki, and Y. Iwasa, *Physical Review B* **98**, 144506 (2018).

[43] “Negative magnetoresistance suppressed through topological phase transition in $(\text{Cd}_{1-x}\text{Zn}_x)_3\text{As}_2$ films” S. Nishihaya, **M. Uchida**, Y. Nakazawa, K. Akiba, M. Kriener, Y. Kozuka, A. Miyake, Y. Taguchi, M. Tokunaga, and M. Kawasaki, *Physical Review B* **97**, 245103 (2018).

[42] “Gate-tuned quantum Hall states in Dirac semimetal $(\text{Cd}_{1-x}\text{Zn}_x)_3\text{As}_2$ ” S. Nishihaya, **M. Uchida**, Y. Nakazawa, M. Kriener, Y. Kozuka, Y. Taguchi, and M. Kawasaki, *Science Advances* **4**, eaar5668 (2018).

[41] “Controlling surface carrier density by illumination in the transparent conductor La-doped BaSnO_3 ” E. B. Lochocki, H. Paik, **M. Uchida**, D. G. Schlom, and K. M. Shen, *Applied Physics Letters* **112**, 181603 (2018).

[40] “Structural characterization of high-mobility Cd_3As_2 films crystallized on SrTiO_3 ” Y. Nakazawa, **M. Uchida**, S. Nishihaya, M. Kriener, Y. Kozuka, Y. Taguchi, and M. Kawasaki, *Scientific Reports* **8**, 2244 (2018).

[39] “Electrical conduction on the surface of ferroelectric PbTiO_3 thin film induced by electrolyte gating” R. Nishino, Y. Kozuka, **M. Uchida**, F. Kagawa, and M. Kawasaki, *Applied Physics Letters* **112**, 051602 (2018).

[38] “Electric-field control of anomalous and topological Hall effects in oxide bilayer thin films” Y. Ohuchi, J. Matsuno, N.

- Ogawa, Y. Kozuka, **M. Uchida**, Y. Tokura, and M. Kawasaki, *Nature Communications* **9**, 213 (2018).
- [37] “All-in-all-out magnetic domain inversion in $\text{Tb}_2\text{Ir}_2\text{O}_7$ with molecular fields anti-parallel to external fields” T. C. Fujita, Y. Kozuka, J. Matsuno, **M. Uchida**, A. Tsukazaki, T. Arima, and M. Kawasaki, *Physical Review Materials* **2**, 011402(R) (2018). *Selected for Editors' Suggestion*
- [36] “Quantum Hall states observed in thin films of Dirac semimetal Cd_3As_2 ” **M. Uchida**, Y. Nakazawa, S. Nishihaya, K. Akiba, M. Kriener, Y. Kozuka, A. Miyake, Y. Taguchi, M. Tokunaga, N. Nagaosa, Y. Tokura, and M. Kawasaki, *Nature Communications* **8**, 2274 (2017).
- [35] “Visualizing ferroic domains in an all-in-all-out antiferromagnet thin film” Y. Kozuka, T. C. Fujita, **M. Uchida**, T. Nojima, A. Tsukazaki, J. Matsuno, T. Arima, and M. Kawasaki, *Physical Review B* **96**, 224417 (2017).
- [34] “Adsorption-controlled growth of La-doped BaSnO_3 by molecular-beam epitaxy” H. Paik, Z. Chen, E. Lochocki, A. Seidner H., A. Verma, N. Tanen, J. Park, **M. Uchida**, S. Shang, B.-C. Zhou, M. Brützam, R. Uecker, Z.-K. Liu, D. Jena, K. M. Shen, D. A. Muller, and D. G. Schlom, *APL Materials* **5**, 116107 (2017).
- [33] “Molecular beam epitaxy growth of superconducting Sr_2RuO_4 films” **M. Uchida**, M. Ide, H. Watanabe, K. S. Takahashi, Y. Tokura, and M. Kawasaki, *APL Materials* **5**, 106108 (2017).
- [32] “Alloy disorder modulated electron transport at $\text{Mg}_x\text{Zn}_{1-x}\text{O}/\text{ZnO}$ heterointerface” A. Vishnuradhan, Y. Kozuka, **M. Uchida**, J. Falson, A. Tsukazaki, and M. Kawasaki, *AIP Advances* **7**, 015029 (2017).
- [31] “Evolution of electronic correlations across the rutile, perovskite, and Ruddelsden-Popper iridates with octahedral connectivity” J. K. Kawasaki, **M. Uchida**, H. Paik, D. G. Schlom, and K. M. Shen, *Physical Review B* **94**, 121104(R) (2016).
- [30] “Evolution of Insulator-Metal Phase Transitions in Epitaxial Tungsten Oxide Films during Electrolyte-Gating” S. Nishihaya, **M. Uchida**, Y. Kozuka, Y. Iwasa, and M. Kawasaki, *ACS Applied Materials & Interfaces* **8**, 22330 (2016).
- [29] “ MgZnO/ZnO heterostructures with electron mobility exceeding $1 \times 10^6 \text{ cm}^2/\text{Vs}$ ” J. Falson, Y. Kozuka, **M. Uchida**, J. H. Smet, T. Arima, A. Tsukazaki and M. Kawasaki, *Scientific Reports* **6**, 26598 (2016).
- [28] “Strain Control of Fermiology and Many-Body Interactions in Two-Dimensional Ruthenates” B. Burganov, C. Adamo, A. Mulder, **M. Uchida**, P. D. C. King, J. W. Harter, D. E. Shai, A. S. Gibbs, A. P. Mackenzie, R. Uecker, M. Bruetzam, M. R. Beasley, C. J. Fennie, D. G. Schlom, and K. M. Shen, *Physical Review Letters* **116**, 197003 (2016).
- [27] “All-in-all-out magnetic domain wall conduction in a pyrochlore iridate heterointerface” T. C. Fujita, **M. Uchida**, Y. Kozuka, W. Sano, A. Tsukazaki, T. Arima, and M. Kawasaki, *Physical Review B* **93**, 064419 (2016). *Selected for Editors' Suggestion*
- [26] “Epitaxially Stabilized Oxide Composed of Twisted Triangular-Lattice Layers” **M. Uchida**, K. Ohba, Y. Ohuchi, Y. Kozuka, and M. Kawasaki, *Chemistry of Materials* **28**, 1165 (2016).
- [25] “Effective carrier doping and metallization in $\text{La}_x\text{Sr}_{2-x-y}\text{Ba}_y\text{IrO}_{4-\delta}$ thin films” M. Ito, **M. Uchida**, Y. Kozuka, K. S. Takahashi, and M. Kawasaki, *Physical Review B* **93**, 045139 (2016).
- [24] “Direct Observation of Electrostatically Driven Band Gap Renormalization in a Degenerate Perovskite Transparent Conducting Oxide” Z. Lebens-Higgins, D. O. Scanlon, H. Paik, S. Sallis, Y. Nie, **M. Uchida**, N. F. Quackenbush, M. J. Wahila, G. E. Sterbinsky, Dario A. Arena, J. C. Woicik, D. G. Schlom, and L. F. J. Piper, *Physical Review Letters* **116**, 027602 (2016).
- [23] “All-in-all-out magnetic domain size in pyrochlore iridate thin films as probed by local magnetotransport” T. C. Fujita, **M. Uchida**, Y. Kozuka, S. Ogawa, A. Tsukazaki, T. Arima, and M. Kawasaki, *Applied Physics Letters* **108**, 022402 (2016).
- [22] “Magnetic properties of spin frustrated spinel $\text{ZnFe}_2\text{O}_4 / \text{ZnCr}_2\text{O}_4$ superlattices” T. Murata, Y. Kozuka, **M. Uchida**, and M. Kawasaki, *Journal of Applied Physics* **118**, 193901 (2015).
- [21] “Formation and Observation of a Quasi-Two-Dimensional d_{xy} Electron Liquid in Epitaxially Stabilized $\text{Sr}_{2-x}\text{La}_x\text{TiO}_4$ Thin Films” Y. F. Nie, D. Di Sante, S. Chatterjee, P. D. C. King, **M. Uchida**, S. Ciuchi, D. G. Schlom, and K. M. Shen, *Physical Review Letters* **115**, 096405 (2015).
- [20] “Field-direction control of the type of charge carriers in nonsymmorphic IrO_2 ” **M. Uchida**, W. Sano, K. S. Takahashi,

T. Koretsune, Y. Kozuka, R. Arita, Y. Tokura, and M. Kawasaki, *Physical Review B* **91**, 241119(R) (2015). *Selected for Editors' Suggestion*

[19] "Band alignment and photovoltaic effect of epitaxial α -PbO thin films" E. Majima, Y. Kozuka, **M. Uchida**, M. Nakamura, and M. Kawasaki, *Applied Physics Express* **8**, 074001 (2015).

[18] "Topological Hall effect in Heisenberg ferromagnet EuO thin films" Y. Ohuchi, Y. Kozuka, **M. Uchida**, K. Ueno, A. Tsukazaki, M. Kawasaki, *Physical Review B* **91**, 245115 (2015).

[17] "Odd-parity magnetoresistance in pyrochlore iridate thin films with broken time-reversal symmetry" T. C. Fujita, Y. Kozuka, **M. Uchida**, A. Tsukazaki, T. Arima, and M. Kawasaki, *Scientific Reports* **5**, 9711 (2015).

[16] "Calibration and control of in-plane Mg doping distribution in $\text{Mg}_x\text{Zn}_{1-x}\text{O}/\text{ZnO}$ heterostructures grown by molecular beam epitaxy" **M. Uchida**, J. Falson, Y. Segawa, Y. Kozuka, A. Tsukazaki, and M. Kawasaki, *Japanese Journal of Applied Physics* **54**, 028004 (2015).

[15] "Interplay of Spin-Orbit Interactions, Dimensionality, and Octahedral Rotations in Semimetallic SrIrO_3 " Y. F. Nie, P. D. C. King, C. H. Kim, **M. Uchida**, H. I. Wei, B. D. Faeth, J. P. Ruf, J. P. C. Ruff, L. Xie, X. Pan, C. J. Fennie, D. G. Schlom, and K. M. Shen, *Physical Review Letters* **114**, 016401 (2015).

[14] "Correlated vs. conventional insulating behavior in the $J_{\text{eff}} = 1/2$ vs. $3/2$ bands in the layered iridate Ba_2IrO_4 " **M. Uchida**, Y. F. Nie, P. D. C. King, C. H. Kim, C. J. Fennie, D. G. Schlom, and K. M. Shen, *Physical Review B* **90**, 075142 (2014).

[13] "Atomic-scale control of competing electronic phases in ultrathin LaNiO_3 " P. D. C. King, H. I. Wei, Y. F. Nie, **M. Uchida**, C. Adamo, S. Zhu, X. He, I. Božović, D. G. Schlom, and K. M. Shen, *Nature Nanotechnology* **9**, 443–447 (2014).

[12] "Evidence for Topologically Protected Surface States and a Superconducting Phase in $[\text{Ti}_4](\text{Ti}_{1-x}\text{Sn}_x)\text{Te}_3$ Using Photoemission, Specific Heat, and Magnetization Measurements, and Density Functional Theory" K. E. Arpino, D. C. Wallace, Y. F. Nie, T. Birol, P. D. C. King, S. Chatterjee, **M. Uchida**, S. M. Koohpayeh, J.-J. Wen, C. J. Fennie, K. M. Shen, and T. M. McQueen, *Physical Review Letters* **112**, 017002 (2014).

[11] "Extremely high electron mobility in a phonon-glass semimetal" S. Ishiwata, Y. Shiomi, M. S. Bahramy, J. S. Lee, T. Suzuki, **M. Uchida**, R. Arita, Y. Taguchi, and Y. Tokura, *Nature Materials* **12**, 512–517 (2013).

[10] "A tunable low-energy photon source for high-resolution angle-resolved photoemission spectroscopy" J. W. Harter, P. D. C. King, E. J. Monkman, D. E. Shai, Y. Nie, **M. Uchida**, B. Burganov, S. Chatterjee, and K. M. Shen, *Review of Scientific Instruments* **83**, 113103 (2012).

[9] "Pseudogap-related charge dynamics in layered-nickelate $\text{R}_{2-x}\text{Sr}_x\text{NiO}_4$ ($x \sim 1$)" **M. Uchida**, Y. Yamasaki, Y. Kaneko, K. Ishizaka, J. Okamoto, H. Nakao, Y. Murakami, and Y. Tokura, *Physical Review B* **86**, 165126 (2012).

[8] "Spin and charge states of Co in half-doped layered cobaltates $\text{La}_{1.5}\text{Ca}_{0.5}\text{CoO}_4$ and $\text{La}_{1.5}\text{Sr}_{0.5}\text{CoO}_4$ " J. S. Lee, Hal. Q. Yamamoto, **M. Uchida**, and Y. Tokura, *Physical Review B* **86**, 045133 (2012).

[7] "Charge-gap formation in the insulating states of $A\text{V}_{10}\text{O}_{15}$ ($A = \text{Ba}, \text{Sr}$)" M. Hoshino, T. Kajita, T. Kanzaki, **M. Uchida**, Y. Tokura, and T. Katsufuji, *Physical Review B* **85**, 085106 (2012).

[6] "Orbital characters of three-dimensional Fermi surfaces in $\text{Eu}_{2-x}\text{Sr}_x\text{NiO}_4$ as probed by soft-x-ray angle-resolved photoemission spectroscopy" **M. Uchida**, K. Ishizaka, P. Hansmann, X. Yang, M. Sakano, J. Miyawaki, R. Arita, Y. Kaneko, Y. Takata, M. Oura, A. Toschi, K. Held, A. Chainani, O. K. Andersen, S. Shin, and Y. Tokura, *Physical Review B* **84**, 241109(R) (2011). *Selected for Editors' Suggestion*

[5] "Thermoelectric response in the incoherent transport region near Mott transition: the case study of $\text{La}_{1-x}\text{Sr}_x\text{VO}_3$ " **M. Uchida**, K. Oishi, M. Matsuo, W. Koshibae, Y. Onose, M. Mori, J. Fujioka, S. Miyasaka, S. Maekawa, and Y. Tokura, *Physical Review B* **83**, 165127 (2011).

[4] "Large magnetoresistance and spin-polarized heavy-mass electron state of the doped valence-bond solid $(\text{Ti}_{1-x}\text{V}_x)_2\text{O}_3$ " **M. Uchida**, Y. Onose, and Y. Tokura, *Physical Review B* **83**, 052404 (2011).

[3] "Pseudogap of metallic layered nickelate $\text{R}_{2-x}\text{Sr}_x\text{NiO}_4$ ($R = \text{Nd}, \text{Eu}$) crystals measured using angle-resolved photoemission spectroscopy" **M. Uchida**, K. Ishizaka, P. Hansmann, Y. Kaneko, Y. Ishida, X. Yang, R. Kumai, A. Toschi, Y. Onose, R. Arita, K. Held, O. K. Andersen, S. Shin, and Y. Tokura, *Physical Review Letters* **106**, 027001 (2011).

[2] "Growth of superconducting Sr_2RuO_4 thin films" Y. Krockenberger, **M. Uchida**, K. S. Takahashi, M. Nakamura, M. Kawasaki, and Y. Tokura, *Applied Physics Letters* **97**, 082502 (2010).

[1] "Charge dynamics in thermally and doping induced insulator-metal transitions of $(\text{Ti}_{1-x}\text{V}_x)_2\text{O}_3$ " **M. Uchida**, J. Fujioka, Y. Onose, and Y. Tokura, *Physical Review Letters* **101**, 066406 (2008).

Research Grants:

- 2018-2021 JST PRESTO "Topological Materials Science for Creation of Innovative Functions"
- 2018-2020 JSPS Grant-in-Aid for Scientific Research (B)
- 2016-2017 JSPS Grant-in-Aid for Scientific Research on Innovative Areas "Topological Materials Science"
- 2015-2016 JSPS Grant-in-Aid for Young Scientists (A)
- 2014-2015 JSPS Grant-in-Aid for Challenging Exploratory Research
- 2012-2013 JSPS Postdoctoral Fellowships for Research Abroad
- 2009-2011 JSPS Research Fellowships for Young Scientists

Awards:

- 2017 Science Poster Prize in CEMS-QPEC Symposium (Science AAAS)
- 2015 Ando Prize for Outstanding Young Scientists (The Foundation of Ando Laboratory)
- 2015 Funai Research Incentive Award (Funai Foundation for Information Technology)
- 2014 Inoue Research Award for Young Scientists (Inoue Foundation for Science)
- 2012 Springer Theses (Springer)

Other Foundation Grants:

- | | | |
|------|--|----------------------------|
| 2016 | The Foundation for The Promotion of Ion Engineering | Research Grant |
| 2016 | The Asahi Glass Foundation | Incentive Research Grant |
| 2016 | Iketani Science and Technology Foundation | Research Grant |
| 2016 | Yazaki Memorial Foundation for Science and Technology | Incentive Research Grant |
| 2015 | The Thermal & Electric Energy Technology Inc. Foundation | Research Grant |
| 2015 | Research Foundation for the Electrotechnology of Chubu | Research Grant |
| 2014 | The Casio Science Promotion Foundation | Research Grant |
| 2014 | The Murata Science Foundation | Research Grant |
| 2014 | Toyota Physical and Chemical Research Institute | Scholar Project |
| 2014 | Mizuho Foundation for the Promotion of Sciences | Engineering Research Grant |