2024
UNISOKU
NEWSLETTER

UNISOKU Co., Ltd.
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Editor ; Yoshihide Seino(Chief), Katsuya Iwaya, Hiroko Fusadate, Nozomi Nishiyama, Chiaki Sawada, Toshiyuki Kawabata
20240417

Artwork：Naho Ito (イトウナホ) Title：Stella Ⅰ

Corporate Philosophy 経営理念

UNISOKU contributes to the development of science and technology by providing customers with measurement systems that meet their exploration needs.

お客様の探究心に応える計測を提供し、お客様の成果を通じて、科学技術の発展に貢献する。

Greetings from Executives

2023年 グッドカンパニー大賞 特別賞受賞

The Director Hiroyuki Mizuno
取締役 水野 博之

We have been constantly developing and manufacturing systems with a spirit of challenge to meet the needs of our customers. In the world of rapid technological progress, we will continue to strive to meet our customers' demands and to propose the best possible products.

私達はお客様のニーズに応えるべく常にチャレンジ精神で装置の開発、製造に取り組んでいます。技術の進歩が早い中、お客様の要望に常に向き合い「如何に良い物を提案出来るか」を課題とした取り組みにこれからも邁進していく所存です。

Hiroyuki Mizuno

President and CEO Yutaka Miyatake
代表取締役社長 宮武 優

We would like to thank our customers and all those involved in our business for the 50th year since our foundation. We aim to contribute to society and achieve steady growth by listening to our customers' needs and incorporating them into our management policy. We take our customers' opinions seriously and will continue to take on the challenge of realizing new 'uniqueness'.

創業から50年目を迎えられますこと、お客様および関係の皆様に感謝申し上げます。私たちはお客様のご要望をお聞きし経営の方針として取り入れることで、社会に貢献し、着実に成長していくことを志しています。お客様の声を真摯にうけとり、新たな"ユニーク"の実現に挑戦を続けてまいります。

Yutaka Miyatake

The Director Tatsuo Nakagawa
取締役 中川 達央

The last three years have seen a series of global events that have forced everyone to change their previous values. We will continue to face our products and customers with a sense of gratitude and humbleness while considering what we can change and how we can contribute to society in the future.

ここ3年、全ての人がこれまでの価値観を変えざるを得ないような世界的な出来事が続きました。私たちは何を変え、そしてこの先どう社会に貢献してゆくのかを考えながら、感謝の気持ち、謙虚さは決して失わず、製品とお客様に向き合ってゆきたいと思います。

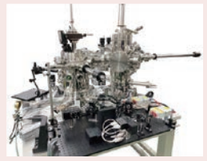
Tatsuo Nakagawa

2023 Yearly Events

January

Time-resolved STM paper was published in Scientific Reports. UNISOKU and Univ. of Tsukuba conducted a joint press release.

時間分解STM論文がScientific Reportsに掲載。筑波大と共同でプレスリリース



1

March

UNISOKU welcomed an international internship student from Yoshida lab at Kanazawa University.

金沢大吉田研究室から留学生インターンシップ受け入れ

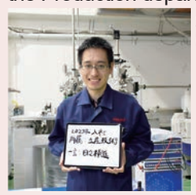
3

April

UNISOKU recieved 'Excellence Award' & 'Environmental Contribution Special Award' in the 35th Small/Medium-Enterprise Excelllent New Technology/Product Award.

第35回中小企業優秀新技術・新製品賞　優秀賞
＆環境貢献特別賞 受賞

A new member joined the Production department.



生産技術グループに新入社員入社

4

May

Development of USM1800 was featured in the Nikkan Kogyo Simbun.

USM1800開発が日刊工業新聞に掲載

The UNISOKU main building was refurbished and the dining room was newly set up.

本社を改装し食堂コーナーを設置

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June

Three papers using UNISOKU systems were simultaneously published in Nature.

ユニソク装置を使用した論文が3本同時にNature掲載

UNISOKU contributed to ICP2023 in Sapporo as an exhibitor, an organizer of the luncheon seminar, and an oral presenter.

第31回
光化学国際会議
（札幌）において
機器展示
ランチョンセミナー
口頭発表を実施

Founder Toshihiko Nagamura passed away.

創設者、長村俊彦氏が逝去

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July

Dr. Iwaya presented at the conference (ISLNN2023) in Guizhou, China.

岩谷(開発部)が
中国・貴州にて
学会発表

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September

UNISOKU sponsored the 2nd Suito Kurawanka Fireworks Festival.

第2回 水都くらわんか花火大会に協賛

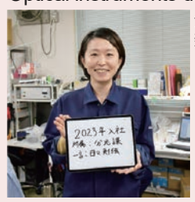
9

October

The Sales Meeting 2023 was held in UNISOKU.

セールスミーティング2023開催

A new member joined the Optical instruments department.



分光課に
新入社員入社

UNISOKU was introduced in the Hirakata City Job Book.

ユニソクが
枚方市「小学生のためのお仕事ノート」
に掲載

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2023年7月21日　50期経営計画会議後撮影

December

UNISOKU was awarded for The 57th (Fiscal Year 2023) Good Company Award Special Prize.

第57回（2023年度）
グッドカンパニー大賞
特別賞 受賞

Dr. Yokota gave a poster presentation about Time-Resolved AFM at ICSPM31.

横田(開発部)がICSPM31で時間分解AFMの成果をポスター発表

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History of our founder, Toshihiko Nagamura

Our founder, Toshihiko Nagamura, who retired in 2013,
passed away on June 17, 2023 (age 86).
Once again, we would like to express our deepest gratitude to
his foundation and great contribution to the development of the business,
training of many employees, and field of science.

2013 年に勇退した創業者の長村俊彦氏は、
2023年6月17日に逝去いたしました（享年86）。
氏によるユニソクの創業、事業の発展への多大なる寄与、
多くの社員への育成、そして科学分野への貢献に対し、あらためて
深く感謝申し上げ、謹んでご冥福をお祈りいたします。

1974

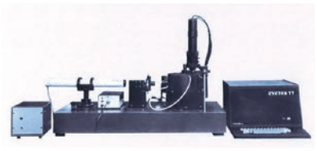
Founded Union Giken Co., Ltd. in 1970.
1970年 ユニオン技研を設立

Founded Union Sokki Co., Ltd.(Nov.)
株式会社ユニオン測器を創業 (11月)

Launched numerous original spectroscopy system to the market.
数々のオリジナル分光製品を世に送り出す

With Dr. M. Eigen, One of the Pioneers in Chemical Reaction Kinetics
反応速度論のパイオニアの一人、アイゲン博士との1枚

Automatic polarimeter
自動旋光計　RM-101



Light Scattering Photometer
光散乱計

私は27歳で独立の研究室を始めるにあたり、伏見譲さんに
ユニオン技研を紹介され、製造を依頼しました。これが私と
長村さんとの出会いです。長村さんがユニソクとして独立
してからは、蛋白質の変性・再生にも使用できる複雑な
ミキサーなど、種々のミキサーの開発に一緒に注力しました。
その後も長村さんとは、お亡くなりになる直前まで、いろいろ
議論しました。
お亡くなりになって、長村さんの存在の大きさを今さら感じて
います。さみしいです。
関西医科大学　名誉教授　木原裕様より

1981

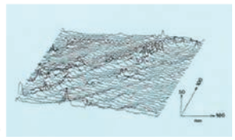
Renamed Union Sokki Co., Ltd. to
UNISOKU Co., Ltd. (Oct.)
株式会社ユニオン測器から株式会社ユニソクに
社名変更 (10月)

Gas-pressure based stopped-flow spectroscopy system
ガス圧方式を採用したストップトフロー分光システム

1986

Productized Japan's first ambient STM system and started its sales.
大気中で使用する日本で初めての走査型トンネル顕微鏡を完成、販売開始

1st UNISOKU STM USM-101
ユニソク最初の STM

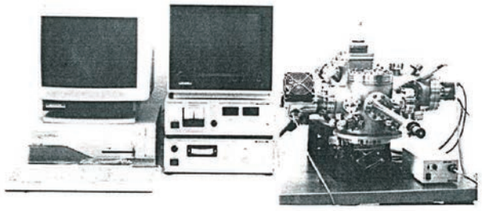


1st UNISOKU STM data
ユニソク最初の STM 像

Snapshot during a company trip to Korea
社員旅行、韓国にて

1989

Productized Ultra-high Vacuum STM systems and started its sales.
超高真空 STM 装置を製品化、販売開始

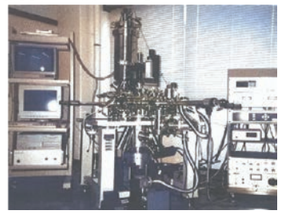


Ultra-high Vacuum STM　USM-301U
超高真空 STM

1991

Productized Ultra-high Vacuum Low Temperature STM systems and started its sales.
超高真空低温 STM を製品化、販売開始

Ultra-high Vacuum
Low Temperature
STM system USM-501
超高真空低温 STM



Ultra-high Vacuum
Low Temperature STM system
USM-602
超高真空低温 STM

長村さんが亡くなられたとのこと、大変残念に思って
います。長村さんには測定装置のことなどで大変お世話
になり感謝しています。学生の頃から分光光度計やガス
圧式のストップトフローなどのいくつかの装置を使わせ
ていただきました。特にストップトフロー装置との関わり
は現在のユニソク製の装置も含めて44年にもなり
ました。この間何度かお会いして装置のことをいろいろ
と教えていただいたことを昨日のことのように思い出
しています。
愛知教育大学　元教授　稲毛正彦様より

長村さんはアイデアに富んだ方で、一緒に様々な議論
を重ねながら新しい実験を検討してくださったり、無理
な要求にも柔軟に応えてくださり、大変感謝して
おります。
筑波大学　教授　重川秀実様より

長村氏には、長い間、装置の作製でお世話になりました。
大抵は、研究室に来られて、作製する装置について話し合いながら
仕事を進めて下さいました。そうして完成した市販品でない装置は
独自性と操作性に優れ、研究室の卒論生、大学院生は何の疑いも
持たずに自由に使いこなして、数々の論文を作成することが出来
ました。今考えると、このような多彩な装置を研究室に備えられた
ことは、幸運以外の何物でもないと思います。長村氏の技術開発へ
の思いとその手法が、ユニソクの方々によって継承され、発展される
ことを願って、長村様のご苦労とお力に思いをはせる次第です。
（有）ミネルバライトラボ　松村竹子様より

心中よりお悔やみ申し上げます。
長村様には若いころから大変お世話になり共にナノ
科学の発展のために励ましあってまいりまして研究室では
長村様の開発された装置を何台かお納めいただき、
長きにわたり愛用させていただきました。
ご退職されてからも、なんどかお会いして若き日の
活躍を称えあったことを想い起こします。
ご冥福を心からお祈りしております。
豊田工業大学　名誉教授　上田一之様より

1998

Built the new head office in Kasugano, Hirakata city
(the current location) and moved head office.
枚方市春日野に新社屋が完成し、本社を移転

1999

Started sales of 2K High Magnetic Field STM, USM1300.
2K 磁場中 STM (USM1300初号機)の販売開始

2000

In the 2000s, the domestic SPM sales gradually dropped,
at the same time, UNISOKU began to expand business in overseas.
2000年代に入るとSPM国内売上は緩やかに下落し、
それと同時に海外展開を始めた。

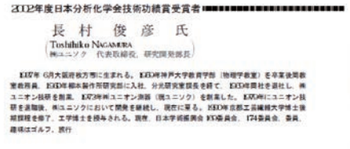
2002

Productized 400mK Very Low Temperature USM1300 systems
and started its sales.
400mK 極低温USM1300の製品化、販売開始

Delivered USM1200 to South Korea as the first STM in oversea.
海外向として初めてのSTM、USM1200を韓国に納入

Taken at a conference in China in 2006, he has taken
the lead in developing SPM's overseas business.
2006年中国の学会にて、自ら先頭に立ち
SPMの海外事業展開に注力

Awarded for “Technological Achievement Award” from The Japan Society for Analytical Chemistry for the development of fast reaction analysis/nanoscale surface analysis.
高速反応解析・ナノスケール表面分析装置の開発の功績で 日本分析化学会技術功績賞 受賞

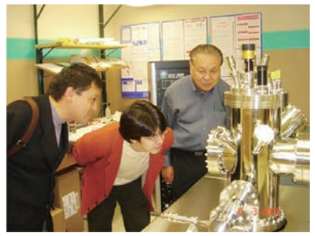

2012年度日本分析化学会技術功績賞受賞者
長村俊彦氏
Toshihiko NAGAMURA
(株)ユニソク 代表取締役、研究開発部長

2003

Delivered USM1300 to Prof. Goran Lab of Argonne National Laboratory as 1st STM in the USA and joined its installation in person.
米国向として初めてのSTM、USM1300をアルゴンヌ研究所ゴーラン研究室に納入
本人が納品に立ち会う

2023 was really a sad year that we lost Nagamura-san.
I was very fortunate to meet Nagamura-san during my first trip to Japan.
He was a remarkable person with a big heart.
I cherish and remember all the moments that I spent with him in Japan and in Chicago.

From Prof. Goran Karapetrov, Drexel University


At RHK Sales Meeting in 2004
2004年RHK Sales Meetingにて

2004

Started sales of Ultra-high Vacuum Low Temperature SPM systems (USM-1400 series).
超高真空極低温 SPM システム USM-1400 シリーズを販売開始

Delivred USM1300 to Prof. Xue Lab of Chinese Academy of Sciences as 1st STM in China.
中国向として初めてのSTM、USM1300を中国科学院 Xue研究室に納入

Delivered 1st USM1400 in China with optical detector to Prof. Dong Lab of USTC.
中国向として初めてのUSM1400型STMを中国科学技術大学 Dong研究室に納入

I am very sad to hear that Nagamura-san, my dear old friend, passed away two days ago.Yes, he has been a very good friend of mine all these years, with a lot of beautiful memories in developing advanced photon-STM systems together, plus happy times in enjoying life and nature.
Please send my condolences to his family members.
May Nagamura-san rest in peace in heaven! He will live in our heart forever!
Sincerely,
From Prof. Zhen-Chao Dong, USTC

2007

Awarded Osaka Persons of Merit for New Technology Development Award from Osaka Prefecture for achievements in the invention of Lower Temperature Scanning Probe Microscope systems.
大阪府より極低温走査型プローブ顕微鏡の考案の功績が評価され、大阪府新技術開発功労者 受賞


At MBSJ2009
2009年分子生物学会にて

2010

UNISOKU joined TII group and he was appointed as Chairman.
Shoji Suruga was iappointed as the second President.
ユニソクがTIIグループに参入し会長に就任
駿河正次が二代目社長として就任


With the second President Suruga
二代目社長駿河と


At Team Appreciation Party in 2010
2010年慰労会にて

Awarded at the Surface Science Society of Japan for his work of Ultra High Vacuum Low Temperature Scanning Probe Microscope.
日本表面科学会 第一回産業賞 受賞

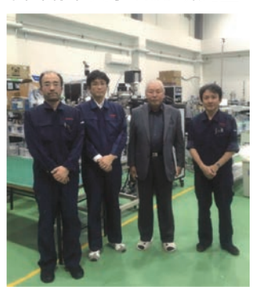

In Sydney, 2012
2012年シドニーにて

2013

Retired Chairman.
会長を勇退


At an international conference in China, 2013
2013年中国の国際学会にて

1st USM1600 System with 40mK specification, which he greatly contributed to its depevelopment, was delivered to Prof. Xue's lab of Tsinghua University, China.
開発に大きく寄与したUSM1600初号機が、中国清華大学 Xue 研究室に納入


His visit to the 2nd factory of UNISOIKU
新工場見学


Farm work with UNISOKU employees
ユニソク社員と共に趣味の農作業

Referred from 45th Anniversary History of UNISOKU, News Letter 2019

“Since UNISOKU was founded, our motto has been ‘Contribute to the progress in science and technology by developing unique instruments in collaboration with customers’. I hope UNISOKU will continue this policy to respond to expectations from customers all around the world.”

2019年ニュースレター 45周年記念特集より引用

「ユニソク創業時のモットーは“顧客と共同してユニークな製品を開発し、科学技術の発展に貢献する”であった。今後も世界の研究者の期待に応える製品の開発を継続してほしい」

(Founder and Former Chairman) Toshihiko Nagamura

Sales Meeting 2023

Inviting nine people of seven distributors from the USA, China, Germany, Taiwan and Korea this year, UNISOKU finally held sales meeting for the first in four years!
As this event was originally scheduled to be held every two years, there was no end to the topics of conversation with the distributors about recent developments, such as business inquiries.

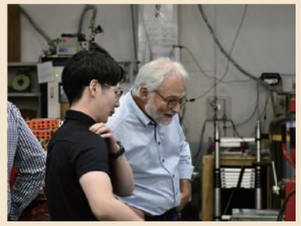
アメリカ、中国、ドイツ、台湾、韓国から７社９名の代理店を招待し4年振りの開催が実現しました!
当初２年毎の開催予定に対して前回から久々の再会ということもあり、代理店の方々とは引合等の近況報告で話題が尽きませんでした。

Invaluable communication that cannot be achieved online
オンラインでは叶わない貴重な交流

This time, we were reminded of the importance of face-to-face meetings in which we could see facial expressions and reactions of the participants. After the presentation from UNISOKU, there were many questions. We are happy to see that our information is being conveyed more accurately to the distributors. We are sure that they will take what they learned from this meeting and apply it to their customer service in their own countries.

今回、相手の表情や反応が見える形での対面のミーティングの重要性を再認識しました。ユニソクからの発表に対したくさんの質問が飛び交い、代理店には私たちの情報がより正確に伝わっていることの証としてうれしく思いました。代理店は本会議で学んだことを自国でのカスタマーサービスに活かしてくれることと思います。

On the last day, we had an optional sightseeing day, which included a cruise around Osaka City on an amphibious bus and a winery tour at Kawachi Winery, which was featured in Newsletter 2021.
For even Osaka local people, it is rare to have a chance to ride on an amphibious bus. The view of Osaka city from the amphibious bus was refreshing. Kawachi Wine was once served at the G20 Osaka Summit banquet. The winery has been cultivating grapes since the mid-Meiji period and its taste of wine is characterized by its sweet aroma and dry taste.
At the winery, about 10 kinds of wine and plum wine were served for tasting.
The wines were so good that participants bought them as souvenirs.



最終日にはオプションの観光日を設け、水陸両用バスで大阪市内をクルーズした後、ニュースレター2021でも紹介した河内ワインにてワイナリー見学と試飲を行いました。
大阪に住んでいてもなかなか乗る機会がない水陸両用バスからの大阪市内の景色は新鮮でした。河内ワイナリーはG20大阪サミット(2019)の晩餐会で振る舞われたこともあり、明治中期からブドウ栽培が盛んで香りが甘く辛口なところが特徴です。
ワイナリーでは10種類ほどのワインや梅酒を試飲でき、参加者がお土産に購入して帰るほど美味しいものでした。

Written by C. Sawada　記：澤田

Our Distributors

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nanoscore tech GmbH

Zum Greifenstein 5, 65594
Runkel, Germany
sales@nanoscore.de
www.nanoscore.de

Introduction of Dr. Andreas Bettac

We are proud to announce that Dr. Andreas Bettac has joined nanoscore. Andy substantially strengthens our sales and customer service activities. He brings in his decades-long experience in SPM instrumentation and market relations. In parallel with the growing number of products and applications this will greatly improve our market presence – and our ability of timely answers to customers' request.

SOUTH KOREA

INA Korea Co., Ltd.

12F, 110 Mallijae-ro,
Mapo-gu, Seoul, 04184
South Korea
shpark@inakr.com
www.inakr.com

Lambda Ray Co., Ltd.

23-13, Mabuk-dong,
Gihung-gu, Yongin-si,
Gyeonggi-do, 16891,
South Korea
jayjeong@lambdaray.co.kr
www.lambdaray.co.kr

CHINA

SPECS-TII Technology (Beijing) Co., Ltd.

Room 418A, Building 39,
4 Workers Stadium North Rd,
Chaoyang District, Beijing
100027, P.R.China
sales@specs-tii.com.cn
www.specs-tii.com.cn

TAIWAN

SHUMOTEK CORP.

No. 111, Jiabei 1st St. Zhunan,
Miaoli County 35058, Taiwan
febchangs@gmail.com
info@shumotek.com
shumotek.com.tw/

● SPM ● Optics ● SPM & Optics

UNISOKU is a member of TII Group, which is headed by our parent company, Tokyo Instruments, Inc.
While respecting the core competencies of TII Group, we aim to **"create new value"** through strong cooperation.

ユニソクは株式会社東京インスツルメンツを親会社とするTIIグループの一員です。
TIIグループが保有するコア・コンピタンスを尊重しながら、強力な協力体制による**"新しい価値の創造"**を目指しています。

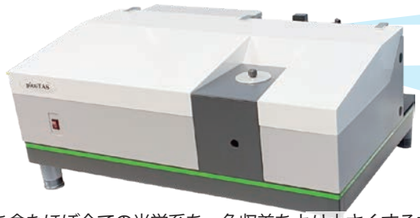
Optical Instruments News

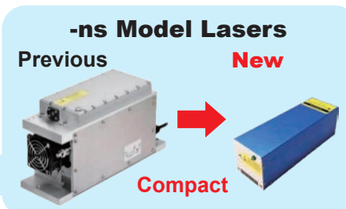
分光製品ニュース

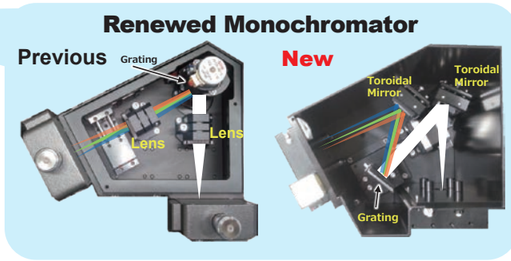
Redesigned most of optical system including monochromators in picoTAS Optics/Mechanics Unit (picoTAS-OMU)

picoTAS の自動制御光学系を一新

- Redesign of optical system: improvement of chromatic aberrations, etc.
- Renewal of motor drive system:
  faster motion of most of motorized units
- Change of top cover:
  plastic to metal for better exogenous noise immunity (EMS)
- Adopted more compact pump laser in -ns model







- 分光器を含むほぼ全ての光学系を、色収差をより小さくするなど再設計
- モーター駆動系を一新　電動部分の多くがより高速に
- トップカバーを樹脂製から外来ノイズに強い金属製に
- nsモデルのレーザーがよりコンパクトに

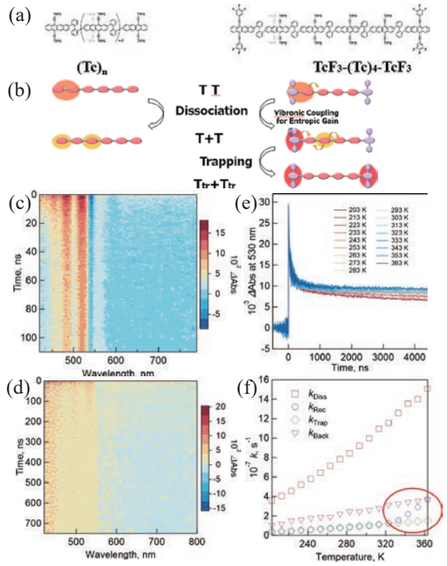
Thermodynamic Control of Intramolecular Singlet Fission and Exciton Transport in Linear Tetracene Oligomers

S. Nakamura *et al*., Angew. Chem. Int. Ed. **62** e202217704 (2023).

Publication Introduction 論文紹介

Recently, singlet fission (SF), a multiexciton generation process that can raise the efficiency of exciton generation up to 200 %, has been actively investigated as a next-generation photo-energy utilization. To enhance the efficiency of SF, Dr. Nakamura of Prof. Hasobe's group, Keio University and co-researchers proposed a molecular design strategy by linear oligomers, and they newly synthesized a series of homo-tetracene [$(Tc)_n$], and hetero-tetracene oligomers [TcF_3-$(Tc)_4$-TcF_3], then evaluated those performances by electron paramagnetic resonance (EPR) and femtosecond to millisecond transient absorption (TA) measurements. Especially, they made full use of CoolSpeK with picoTAS and TSP-2000, namely, they measured temperature dependence of rate constants of each process by TA to precisely calculate thermodynamic parameters and succeeded in explaining the high efficiency of SF in both $(Tc)_n$ and TcF_3-$(Tc)_4$-TcF_3. Especially, efficient localization of exciton trapping was confirmed in TcF_3-$(Tc)_4$-TcF_3, with a trapped triplet yield of 176% due to the increase of entropy change, ΔS.
Such thermodynamic control of SF by this molecular design will provide a new perspective for novel photofunctional systems such as quantum information science and solar energy conversion.

Illustration and Data Courtesy from Prof. Hasobe



(a) Chemical structures of Tc-oligomers, (b) Conceptual schemes, (c) psTA spectra of $(Tc)_2$ in toluene, (d) psTA spectra of TcF_3-$(Tc)_4$–TcF_3 in PhCN, (e) TA Decay profiles of $(Tc)_4$ at 530 nm at different temperatures, (f) The plots of k vs. temperature in TcF_3-$(Tc)_4$–TcF_3

Book Introduction 書籍・記事紹介

The 42nd Issue of 'Essentials in Chemistry'

化学の要点シリーズ42

In "Time-resolved measurement of chemical reactions with pulsed lasers: Transient Absorption Measurement", the 42nd issue of 'Essentials in Chemistry' (in Japanese), an explanatory article of RIPT method was written by us.
化学の要点シリーズ42『パルスレーザーによる化学反応の時間分解計測: 過渡吸収測定』の中で、RIPT法に関する解説記事執筆を担当。

The December 2023 Issue of "KOUKAGAKU"

光化学協会協会誌　2023年12月号

In the December 2023 issue of "KOUKAGAKU (photochemistry)" (in Japanese), a magazine published from the Japanese Photochemistry Association, our director, Dr. Nakagawa, wrote the preface, "Supporting members that give opinions"

光化学協会の会誌2023年12月号にて、巻頭言執筆を担当。

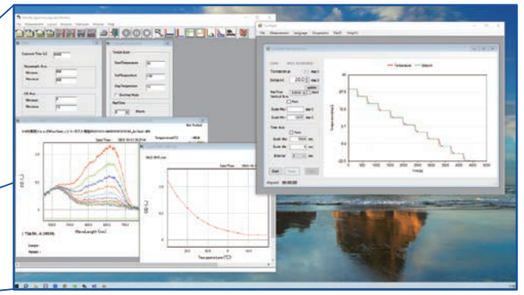
CoolSpeK Updates CoolSpeKの最新情報

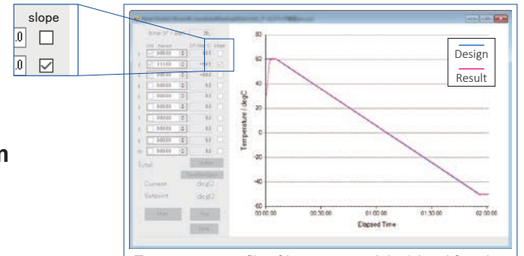
CoolLinK Automatic Temperature Variable Software

自動温度可変ソフトウェア

Automatic temperature-dependent spectra measurement is now available!

温度依存スペクトルの自動測定が可能に！





Temperature profile of 'constant rate' by 'slope' function

- Easy to design temperature profile with PC
- Monitorable actual temperature in real time
- Linkable with various commercial spectroscopy system

- 専用ソフトにより容易に温度プロファイルのデザインが可能
- 実際の温度をリアルタイムで監視可能
- 各社の分光光度計との連携が可能*

*機種に依存します

Adapter for Agilent Cary 3500 Flexible Module

Agilent Cary3500 Flexible Moduleに対応

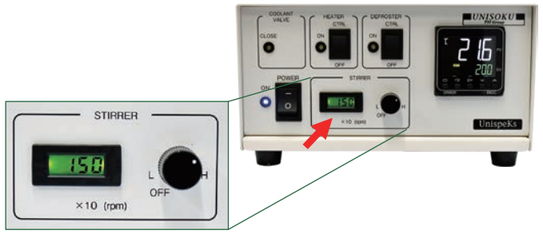
Adapter for Agilent Cary 3500 Flexible Module has been released. For more information, please have a look at the instruction movie on YouTube.

Agilent社の
Cary 3500 Flexible Module
への取り付けに対応
取り付け方法のインストラクション
動画をYouTubeで公開中

YouTube

Rotation Indicator of Magnetic Stirrer

スターラー回転数表示機能を追加



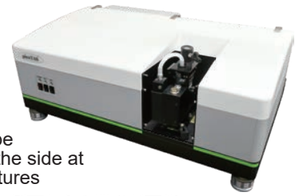
A rotation indicator of magnetic stirrer is available.
温度コントローラーにスターラーの回転数表示機能を追加

CoolSpeK SLIM

CoolSpeK SLIM (USP-203C-ST-BP)

Cryostat for 2 mm light-path cuvette. It is suitable for picoTAS, pump-probe spectroscopy system, etc.

光路長2mmの光学セル専用
picoTASやポンププローブ法での過渡吸収測定に最適



Possible to be stirred from the side at low temperatures
低温下において側面からの撹拌が可能

CoolSpeK with Large Optical Windows

CoolSpeK 広角型 (USP-203C-SH-CD)

This model has larger optical windows than standard type has.* It is suitable for measuring circular dichroic spectrum. Most of accessories for standard type are also available with this model.

標準型より大きい光学窓を採用。*
開口角が大きいので円二色性スペクトル測定や入射光に角度を付けた測定に最適
標準型で使用できる光学セル、各種分光光度計用アダプタのほとんどが使用可能

* **Large Type: Φ22 mm**
Standard Type: Φ10 mm

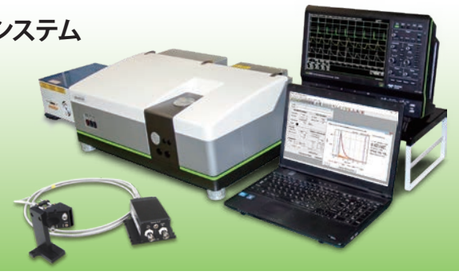
来社実験サービスのご案内

We Now Offer In-House Experimental Demonstrations.

弊社では最新製品のデモルームを開設し、来社実験サービスを行っています。興味を持っていただいた製品について、購入前に実際に性能を確認の上、購入後も満足して使っていただきたいと考えております。また装置をなかなか購入できないお客様にも測定をしていただき、研究の一助となりたいとも願っております。

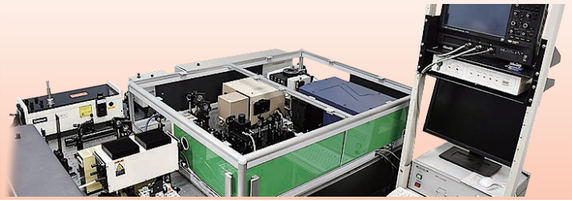
Because we aim for after-purchase satisfaction, we provide our customers the opportunity to check the product performance before purchase. Further, we also aim to help customers who are not ready to purchase our systems conduct their research. To these ends, we have set up a room showing the newest instruments, both for demonstration purposes and for in-house experiment service.

ピコ秒過渡吸収分光 + 蛍光寿命コンバインシステム
picoTAS + TCSPC
Combined System of Picosecond Transient Absorption and TCSPC Fluorescence Lifetime



分光用クライオスタット
CoolSpeK※
Cryostat for Spectrophotometer USP-203 Series

近赤外対応ナノ秒時間分解分光測定装置
TSP-2000
Conventional UV/VIS/NIR Flash Photolysis System



※CoolSpeKにつきましてはお客様のラボに伺い、お客様が所有している分光計と組み合わせることによる訪問デモ測定も随時行っております (国内限定サービスとなっております)。

We also offer on-site CoolSpek demonstration at your facility. CoolSpek adaptation to your spectrometer for custom demonstration measurements is available (only domestic)

Hydrogen-Sensitive Thermal Desorption Spectroscopy System

HEMTO-TDS
超高感度熱脱離分析装置

デモ測定受付中
※こちらはデモ測定のみの対応です。
Now Accepting Demo Measurements

試料導入室を備えたスタンドアロンの3室構成のシステムをデモ測定器として準備しています。本計測は大気中での水分吸着に敏感な可能性がありますので、試料の導入方法や測定内容については相談して進めさせていただきます。

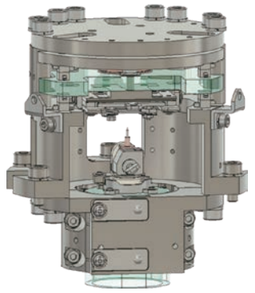
【Custom demo measurements】
We organize demonstration measurements of your samples using the HEMTO-TDS at our facility.
Contact us to discuss the details of the samples you are interested in!

SPM Product Development News
SPM 製品開発ニュース

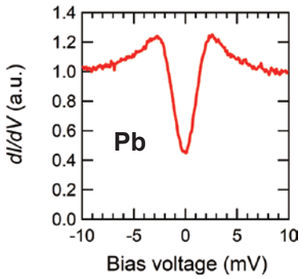
Cryogen-Free SPM (USM1800)
液体ヘリウムフリー低温SPM

New version compatible with flag-type sample holders released!

SPM head



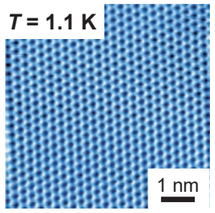
T_{SPM} = 3.5 K



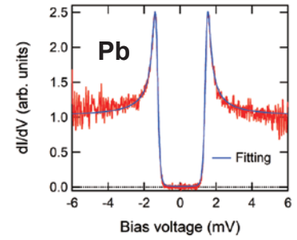
第35回中小企業優秀新技術・新製品賞
（主催 りそな中小企業振興財団 日刊工業新聞社）にて、
本装置が優秀賞と環境貢献特別賞を受賞しました。

USM1200-JT
ジュールトムソンUSM1200

STM image of HOPG



T_{eff} = 0.9 K



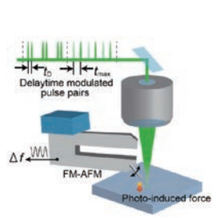
^{3}He operation is now available!

- Under ^{4}He operation,
  the base temperature is 1.1 K.
- Under ^{3}He operation,
  the electron temperature is 0.9 K.

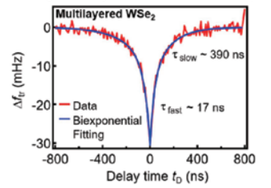
Time-Resolved Atomic Force Microscopy
時間分解AFM

Our compact optical pump-probe system can be applied to AFM!

1. Tuning fork type time-resolved frequency modulation AFM



Time-resolved force signal
using the delay-time modulation technique

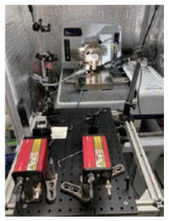


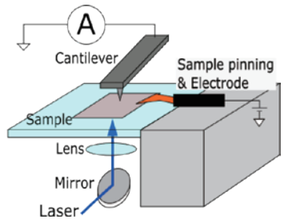
H. Mogi *et al.*, Appl. Phys. Express **17**, 015003 (2024).

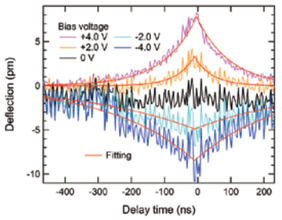
Collaboration with Prof. Shigekawa group (Univ. of Tsukuba)

The introductory article was published.
“Next-Generation Time-Resolved Scanning Probe Microscopy”
K. Iwaya *et al.*, Imaging & Microscopy 26, 34 (2024).

2. Time-resolved AFM in ambient conditions using a versatile SPM system







Collaboration with Dr. Minato (Institute for Molecular Science)

Time-resolved force signals were clearly detected!

SPM製品の来社実験サービスを始めました!!

On-Site SPM Experimental Service

目的 Objective

弊社は極低温SPM計測に必要な測定環境を提供する、**"レンタルラボ"**サービスを開始いたします。
低温SPMを広く、挑戦的にご利用いただくため極低温SPM計測プラットフォームを立ち上げました。

We are pleased to announce the launch of our **'Rental Lab'** service, providing the necessary measurement environment for Ultra-low Temperature SPM measurements.
To facilitate widespread and innovative use of Low-temperature SPM, we have established an ultra-low temperature SPM measurement platform.

サービス内容 Service Description

弊社ハイエンド低温SPM装置を社内に常設し、計測環境を国内外の研究者に有償でご提供いたします。
利用形態は来社実験、On-line接続でのリモート実験など、ご要望に合わせた環境を提供いたします。

We have installed our high-end Ultra-low-temperature SPM equipment within our company premises and offer measurement environments to researchers worldwide on a paid basis. Our services include on-site experiments and remote experiments via online connections, tailored to meet your specific requirements.

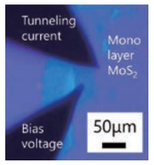
利用受け入れ装置 Available Systems

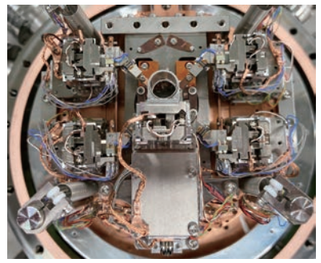
UHV Time-Resolved Multi-Probe Microscopy 超高真空時間分解マルチプローブ顕微鏡

Available Now

Carrier dynamics measurement
of micro samples
on insulating substrate

Demo measurement conditions
- Temperature: 77 K or 300 K
- Pressure: ~10^{-8} Pa
- Laser wavelength: 488, 532 nm
- Temporal resolution: ~80 ps (532 nm), ~10 ns (488 nm)





利用受入れ中

絶縁基板上の微小サンプルの
キャリアダイナミクスを測定可能

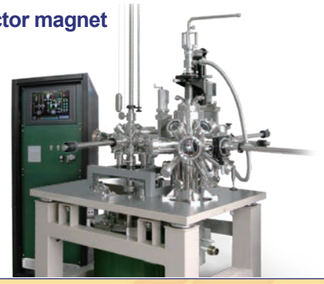
デモ実験条件
温度: 77 K 又は 300 K
真空度: ~10^{-8} Pa
レーザー波長: 488, 532 nm
時間分解能: ~80 ps (532 nm),
~10 ns (488 nm)

40 mK UHV STM 1.75 T-1.75 T-7 T vector magnet

Now Accepting

USM1600

Specifications
- $T_{STM\ Head}$ = 40mK
- Vector Magnet operation
- RF-STM
- Long-term dI/dV measurement



40 mK 超高真空強磁場STM

相談受付中

装置仕様
40 mK以下
ベクターマグネット操作
高周波STM測定
長時間dI/dV測定

1.5 K UHV SPM with optical access

Now Accepting

USM1200 JT

Specifications
- $T_{STM\ Head}$ = 1.5 K (when optical shutters close)
- Compatible with AFM measurement
- Optical access capabilities by inertial-driven lens stages
- Time resolved STM with high spatial resolution
- Shot noise measurement by integrated RydeenAmp

1.5 K超高真空光学アクセスSPM

相談受付中

装置仕様
試料温度1.5 K以下（光学アクセス閉鎖時）
AFM対応　内部レンズ付き光学アクセス
高空間分解能時間分解STM
Rydeen Amp (内蔵高周波アンプ)によるショットノイズ測定

来社実験詳細についてはお気軽にご相談ください!
Feel free to contact us about the details! ▶ ▶ ▶ info@unisoku.co.jp

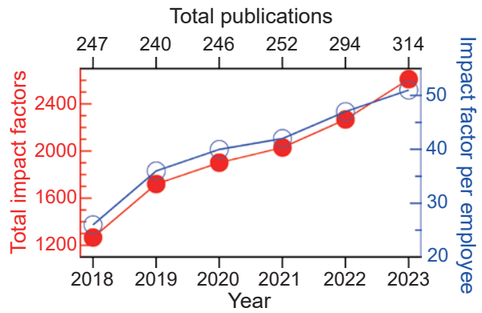
Introduction of Publications

論文の紹介

Publication Stats in 2023

- Total number of publications using UNISOKU systems = 314 (294 in 2022)
- Total impact factors ~2610 (2268 in 2022)
  Corresponding to 40 Nature papers (45 in 2022)
  c.f. impact factor of Nature ~64 (50 in 2022)
- Impact factor per employee ~ 51 (~47 in 2022)

Popular Research Fields	Num. of Publications	Average Impact Factor
Low Dimensional Materials excluding TMDs, graphene, 2D superconductivity	36	8.8
Molecules	29	11.5
Transition Metal Dichalcogenides (TMDs)	27	14.2
Graphene (Twisted Bilayer Graphene)	22	14.2
Kagome Materials	20	14.0
2D Superconductivity	18	9.6
Topological Materials (Majorana, Weyl)	14	11.2
Fe-based Superconductors	14	13.5
Single Atom Spin (ESR-STM)	7	23.2



Publication List in 2023

Nature

1. **Smectic Pair-Density-Wave Order in $EuRbFe_4As_4$**
   H. Zhao *et al.*, Nature **618**, 940 (2023). *USM1300*
2. **Magnetic-Field-Sensitive Charge Density Waves in the Superconductor UTe_2**
   A. Aishwarya *et al.*, Nature **618**, 928 (2023). *USM1300*
3. **Detection of a Pair Density Wave State in UTe_2**
   Q. Gu *et al.*, Nature **618**, 921 (2023). *USM1500*
4. **Imaging Inter-Valley Coherent Order in Magic-Angle Twisted Trilayer Graphene**
   H. Kim *et al.*, Nature **623**, 942 (2023). *USM1300*

Science

An Atomic-Scale Multi-Qubit Platform
Y. Wang *et al.*, Science **382**, 87 (2023). *USM1300*

Nature Materials

1. **Tip-Induced Excitonic Luminescence Nanoscopy of An Atomically-Resolved Van Der Waals Heterostructure**
   L. Parra Lopez *et al.*, Nat. Mater. **22**, 482 (2023). *USM1400*
2. **Tunable Spin and Valley Excitations of Correlated Insulators in Γ-Valley Moiré Bands**
   B. Foutty *et al.*, Nat. Mater. **22**, 731 (2023). *USM1300*

Publication List in 2023

Advanced Materials

1. **Spin-Resolved Imaging of Antiferromagnetic Order in Fe_4Se_5 Ultrathin Films on $SrTiO_3$**
   W. Zhang *et al*., Adv. Mater. **35**, 2209931 (2023). *USM1500*

2. **Evidence of Nodal Superconductivity in Monolayer 1H-TaS_2 with Hidden Order Fluctuations**
   V. Vano *et al*., Adv. Mater. **35**, 2305409 (2023). *USM1300*

Advanced Energy Materials

Origin of Enhanced Overall Water Splitting Efficiency in Aluminum-Doped $SrTiO_3$ Photocatalyst
D. Murthy *et al.,* Adv. Energy Mater. **13**, 2302064 (2023). *USP-OBB-75XE*

Chem

Photodynamic Treatment of Acute Vascular Occlusion by Using an Iron–Nitrosyl Complex
J. Choe *et al*., Chem **9**, 1309 (2023). *CoolSpeK*

Nature Chemistry

1. **Air- And Photo-stable Luminescent Carbodicarbene-Azaboraacenium Ions**
   C. Deng *et al.,* Nat. Chem. **16**, 437 (2023). *CoolSpeK*

2. **Quantum Nanomagnets in On-Surface Metal-Free Porphyrin Chains**
   Y. Zhao *et al.,* Nat. Chem. **15**, 53 (2023). *JT*

Nature Physics

1. **Evidence for Chiral Superconductivity On a Silicon Surface**
   F. Ming *et al*., Nat. Phys. **19**, 500 (2023). *USM1300*

Nature Physics-2

2. **Unidirectional Coherent Quasiparticles in the High-Temperature Rotational Symmetry Broken Phase of AV_3Sb_5 Kagome Superconductors**
   H. Li *et al.,* Nat. Phys. **19**, 637 (2023). *USM1300*

3. **Unidirectional Electron-Phonon Coupling in the Nematic State in a Kagome Superconductor**
   P. Wu *et al*., Nat. Phys. **19**, 1143 (2023). *USM1300*

4. **Electronic Nematicity in the Absence of Charge Density Waves in a New Titanium-Based Kagome Metal**
   H. Li *et al.,* Nat. Phys. **19**, 1591 (2023). *USM1300*

5. **Hofstadter States and Re-Entrant Charge Order in a Semiconductor Moiré Lattice**
   C. Kometter *et al*., Nat. Phys. **19**, 1861 (2023). *USM1300*

National Science Review

Structure Transformation from Sierpiński Triangles to Chains Assisted by Gas Molecules
C. Li *et al.,* Natl. Sci. **10**, nwad088 (2023). *USM1500*

Science Bulletin

1. **Charge Instability of Topological Fermi Arcs in Chiral Crystal CoSi**
   Z. Rao *et al*., Sci. Bull. **68**, 165 (2023). *USM1300*

2. **Inducing Itinerant Ferromagnetism by Manipulating van Hove Singularity in Epitaxial Monolayer 1T-VSe_2**
   J. Zong *et al*., Sci. Bull. 68, 990 (2023). *USM1300*

ACS Nano-1

1. **Sensing the Local Magnetic Environment Through Optically Active Defects in a Layered Magnetic Semiconductor**
   J. Klein *et al*., ACS Nano **17**, 288 (2023). *USM1400-4P*

2. **The Bulk van der Waals Layered Magnet CrSBr is a Quasi-1D Material**
   J. Klein *et al*., ACS Nano **17**, 5316 (2023). *USM1400-4P*

3. **Single-Atomic-Layer Stanene on Ferromagnetic Co Nanoislands with Topological Band Structures**
   C. Chen *et al*., ACS Nano **17**, 7456 (2023). *USM1300*

4. **Realizing a Superconducting Square-Lattice Bismuth Monolayer**
   E. Oh *et al*., ACS Nano **17**, 7604 (2023).

5. **Inelastic Light Scattering in the Vicinity of a Single-Atom Quantum Point Contact in a Plasmonic Picocavity**
   S. Liu *et al*., ACS Nano **17**, 10172 (2023). *USM1400*

6. **Tuning Chirality of Self-Assembled PTCDA Molecules on a Au(111) Surface by Na Coordination**
   Z. Liang *et al.,* ACS Nano **17**, 10938 (2023). *USM1400*

Imaging Inter-Valley Coherent Order in Magic-Angle Twisted Trilayer Graphene

Kim, Choi *et al.,* Nature **623**, 942 (2023). Product used: USM1300

This study focuses on magic-angle twisted trilayer graphene (MATTG), exploring its correlated electronic phases that break underlying symmetries. Using scanning tunneling microscopy, Kim, Choi *et al.* (Nadj-Perge group, California Institute of Technology) identify interaction-driven spatial symmetry breaking in low-strain samples, revealing atomic-scale reconstruction and correlated gaps in the tunneling spectrum. The observed Kekulé supercell suggests spontaneous inter-valley coherence between electrons, persisting across magnetic fields and temperatures associated with gap development. Large-scale maps show the coexistence of atomic-scale reconstruction and translation symmetry breaking at the longer moiré scale. The auto-correlation and Fourier analyses support the theoretically proposed incommensurate Kekulé spiral order. The findings provide insights into MATTG correlated phases, suggesting that superconductivity arises from an inter-valley coherent parent state.

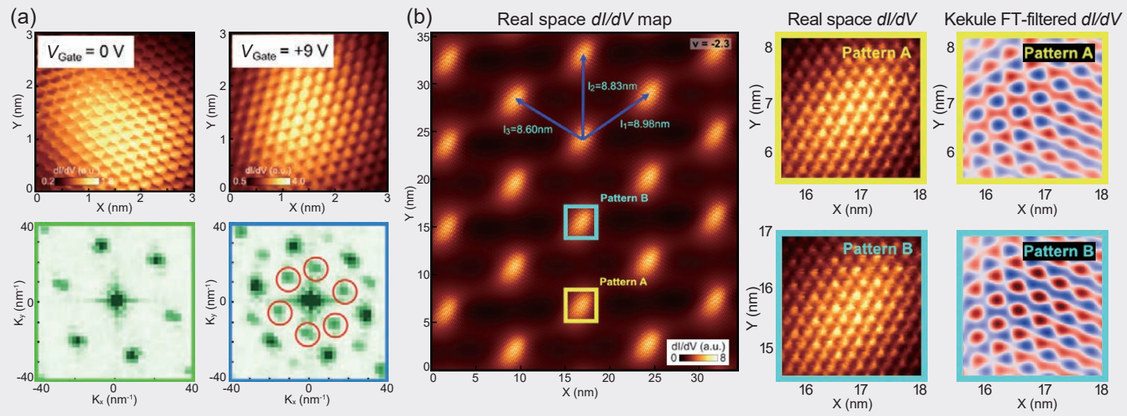


Figure (a) *dI/dV* map at V_{Gate} = 0 V, +9 V and its Fourier-transformed image showing V_{Gate} dependent Kekulé order on MATTG. (b) Evidence of moiré translation symmetry breaking. (Left) Large-scale dI/dV map including 20 moiré AAA sites. (Right) Kekulé order in Pattern A and B in the left image, showing inverted contrast between neighboring AAA sites.

Evidence for Chiral Superconductivity on a Silicon Surface

Ming, Wu *et al.,* Nat. Phys. **19**, 500 (2023). Product used: USM1300

Low-dimensional superconductivity has attracted considerable interest for decades. Tin (Sn) adatoms on a silicon (Si) substrate at a one-third monolayer coverage form a two-dimensional triangular lattice with unpaired electrons. The electrons organize into an antiferromagnetic Mott-insulating state, but doping the Sn layer with holes transforms it into a two-dimensional conductor that exhibits superconductivity at low temperatures. The repulsive interactions and frustration due to the triangular lattice suggest the possibility of unconventional superconductivity. Using scanning tunneling techniques, Ming *et al*. (Wang group, Southern University of Science and Technology and Weitering group, Univ. of Tennessee) find a doping-dependent superconducting critical temperature, a fully gapped order parameter, evidence of time-reversal symmetry breaking, and enhanced zero-bias conductance near superconducting domain edges. These results hint at the possibility of Sn/Si(111) being an unconventional chiral d-wave superconductor.

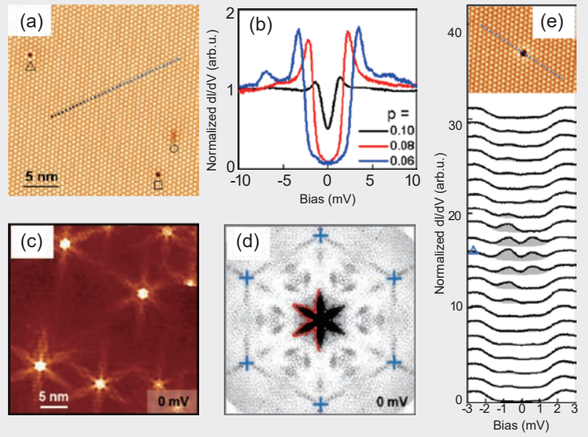


Figure (a) STM image of (√3×√3)-Sn surface on Si(111). (b) Doping dependence of the superconducting gap. T = 0.5 K. (c) Conductance map at zero bias. (d) Fourier-transform of (c) showing a characteristic flower-like feature at q = 0. (e) *dI/dV* spectra across the substitutional Si defect showing two gap states (shaded).

Publication List in 2023

ACS Nano-2

7. Double-Resonance Spectroscopy of Coupled Electron Spins on a Surface
S. Phark *et al.,* ACS Nano **17**, 14144 (2023). *USM1300*

8. Influence of the Magnetic Tip on Heterodimers in Electron Spin Resonance Combined with Scanning Tunneling Microscopy
X. Zhang *et al.,* ACS Nano **17**, 16935 (2023). *USM1300*

9. Optical Imaging of a Single Molecule with Subnanometer Resolution by Photoinduced Force Microscopy
T. Yamamoto *et al.,* ACS Nano **18**, 1724 (2023). *USM1400*

Nature Communications-1

1. Charge Order Driven by Multiple-Q spin Fluctuations in Heavily Electron-Doped Iron Selenide Superconductors
Z. Chen *et al.,* Nat. Commun. **14**, 2023 (2023).

2. Controllable Dimensionality Conversion between 1D and 2D $CrCl_3$ Magnetic Nanostructures
S. Lu *et al*., Nat. Commun. **14**, 2465 (2023). *USM1300*

3. Spectroscopic Signature of Obstructed Surface States in $SrIn_2P_2$
X. Liu *et al*., Nat. Commun. **14**, 2905 (2023). *USM1500*

5. Single-Electron Charge Transfer into Putative Majorana and Trivial Modes in Individual Vortices
J. Ge *et al*., Nat. Commun. **14**, 3341 (2023). *USM1500*

6. A Unique Van Hove Singularity in Kagome Superconductor $CsV_{3-x}Ta_xSb_5$ with Enhanced Superconductivity
Y. Luo *et al*., Nat. Commun. **14**, 3819 (2023). *USM1300*

7. Manipulating Single Excess Electrons in Monolayer Transition Metal Dihalide
M. Cai *et al.,* Nat. Commun. **14**, 3691 (2023). *USM1500*

8. Towards Layer-Selective Quantum Spin Hall Channels in Weak Topological Insulator $Bi_4Br_2I_2$
J. Zhong *et al.,* Nat. Commun. **14**, 4964 (2023). *SNOM1400*

9. From Stoner to Local Moment Magnetism in Atomically Thin Cr_2Te_3
Y. Zhong *et al*., Nat. Commun. **14**, 5340 (2023). *USM1300*

Single-Electron Charge Transfer into Putative Majorana and Trivial Modes in Individual Vortices

Ge *et al.,* Nat. Commun., **14**, 3341 (2023). Product used: USM1500

This study investigates Majorana bound states, which are collective excitations in solids with properties of Majorana fermions, known for being their own antiparticles. In iron-based superconductors, zero-energy states in vortices have been suggested as potential Majorana bound states, but the evidence has remained debated. Using scanning tunneling noise spectroscopy, Ge *et al*. (Milan Allan group, Leiden University) examined tunneling into vortex bound states in the superconductors $NbSe_2$ and $FeTe_{0.55}Se_{0.45}$. They observed charge transfer of a single electron in both cases. For $FeTe_{0.55}Se_{0.45}$, the findings exclude Yu–Shiba–Rusinov states, supporting the possibility of both Majorana and trivial vortex bound states. The results provide insights into exotic states in vortex cores and implications for future Majorana devices, but further theoretical investigations are needed, especially regarding charge dynamics and superconducting tips.

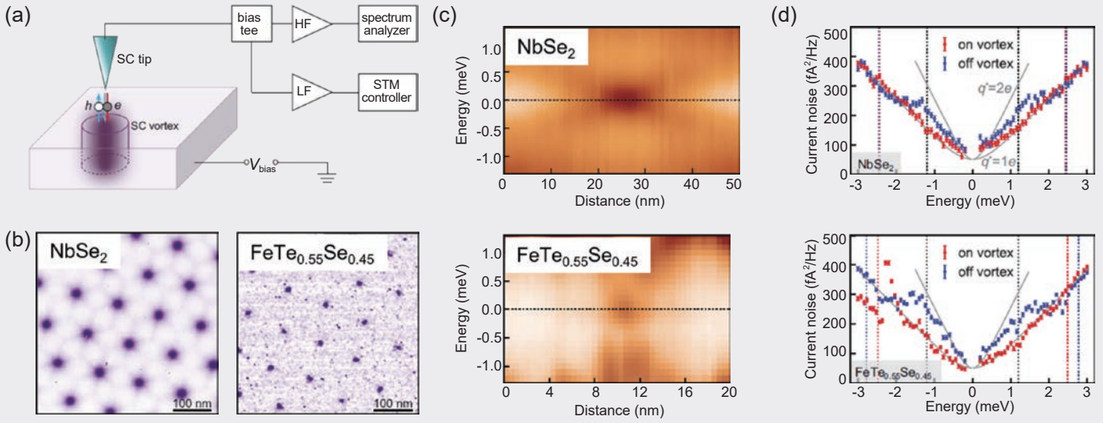


Figure (a) Scanning tunneling noise microscopy setup. (b) Vortex lattice image of $NbSe_2$ and $FeTe_{0.55}Se_{0.45}$. (c) Local DOS across the vortex core in $NbSe_2$ (splitting) and $FeTe_{0.55}Se_{0.45}$ (no-splitting). (d) Local noise spectroscopy on and off vortices in $NbSe_2$ and $FeTe_{0.55}Se_{0.45}$.

Nature Communications-2

10. Visualizing Symmetry-Breaking Electronic Orders in Epitaxial Kagome Magnet FeSn Films
H. Zhang *et al.,* Nat. Commun. **14**, 6167 (2023). *USM1300*

11. Electric Control of Spin Transitions at the Atomic Scale
P. Kot *et al.,* Nat. Commun. **14**, 6612 (2023). *USM1300*

12. Spin Skyrmion Gaps as Signatures of Strong-Coupling Insulators in Magic-Angle Twisted Bilayer Graphene
J. Yu *et al.,* Nat. Commun. **14**, 6679 (2023). *USM1300*

13. Intrinsic Surface p-wave Superconductivity in Layered $AuSn_4$
W. Zhu *et al.,* Nat. Commun. **14**, 7012 (2023). *USM1300*

14. Evidence for Ground State Coherence in a Two-Dimensional Kondo Lattice
W. Wan *et al.,* Nat. Commun. **14**, 7005 (2023). *USM1300*

15. Singlet Fission as a Polarized Spin Generator for Dynamic Nuclear Polarization
Y. Kawashima *et al.,* Nat. Commun. 14, 1056 (2023). *CoolSpeK, USP-PSMM-NP*

Advanced Science

1. Electric-Field-Driven Spin Resonance by On-Surface Exchange Coupling to a Single-Atom Magnet
S. Phark *et al*., Adv. Sci. **10**, 2302023 (2023). *USM1300*

2. Electronic Flat Band in Distorted Colouring Triangle Lattice
Y. Li *et al.,* Adv. Sci. DOI: 10.1002/advs.202303483 *USM1500*

3. Anomalous Hall Conductivity and Nernst Effect of the Ideal Weyl Semimetallic Ferromagnet $EuCd_2As_2$
S. Roychowdhury *et al.,* Adv. Sci. **10**, 2207121 (2023). *USM1300*

Angewandte Chemie International Edition

1. Chemical Enhancement and Quenching in Single-Molecule Tip-Enhanced Raman Spectroscopy
B. Yang *et al*., Angew. Chem. Int. ed. **62**, e202218799 (2023). *USM1400*

2. Atomic-Scale Insights into the Interlayer Characteristics and Oxygen Reactivity of Bilayer Borophene
L. Li *et al*., Angew. Chem. Int. ed. **62**, e2023065 (2023). *USM1400*

3. Thermodynamic Control of Intramolecular Singlet Fission and Exciton Transport in Linear Tetracene Oligomers
S. Nakamura *et al*., Angew. Chem. Int. ed. 62, e202217704 (2023). *picoTAS*

Electric Control of Spin Transitions at the Atomic Scale

Kot *et al*., Nat. Commun. **14**, 6612(2023). Product used: USM1300

This study addresses the longstanding pursuit of electric spin control in solid-state physics, aiming to enhance information processing efficiency. The approach involves transitioning spintronics to the atomic scale. Using electron spin resonance scanning tunneling microscopy (ESR-STM), Kot *et al*. (Ast group, Max-Planck-Institut für Festkörperforschung) demonstrate electric control of spin resonance transitions in individual TiH molecules. Significant bias voltage-dependent shifts in the ESR signal, approximately ten times its line width, are observed. These shifts are attributed to the electric field in the tunnel junction, causing a displacement of the spin system and altering the g-factor and effective magnetic field of the tip. The study further demonstrates direct electric control of spin transitions in coupled TiH dimers, presenting new possibilities for coherent control of interconnected spin systems and contributing to an enhanced understanding of spin-electric coupling.

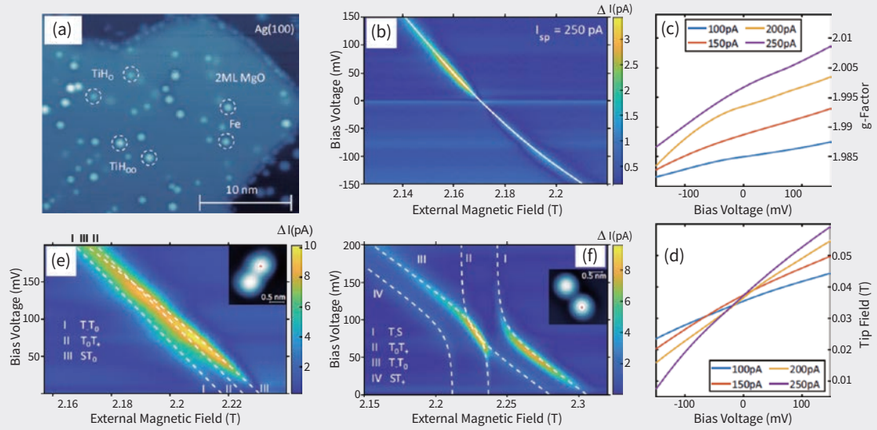


Figure
(a) STM image of TiH molecules on 2ML MgO.
(b) ESR signals at individual TiH molecule as a function of magnetic field and bias voltage.
(c,d) Extracted g-factor and tip field as a function of bias voltage, respectively.
(e, f) Interaction tuning in two different TiH molecule dimers.

Publication List in 2023

Journal of the American Chemical Society

1. **Collective Quantum Magnetism in Nitrogen-Doped Nanographenes**
   G. Zhu *et al.,* J. Am. Chem. Soc. **145**, 7136 (2023). *JT-STM, AFM*

2. **Remote-Triggered Domino-like Cyclodehydrogenation in Second-Layer Topological Graphene Nanoribbons**
   C. Ma *et al.*, J. Am. Chem. Soc. **145**, 10126 (2023). *USM1300*

3. **Revealing Intramolecular Isotope Effects with Chemical-Bond Precision**
   X. Zhu *et al.,* J. Am. Chem. Soc. **145**, 13839 (2023). *USM1400TERS*

4. **Assembling Surface Molecular Sierpiński Triangle Fractals via K+-Invoked Electrostatic Interaction**
   J. Dai *et al.*, J. Am. Chem. Soc. **145**, 13531 (2023). *USM1200*

5. **Realization of Long Operational Lifetimes in Vacuum-Deposited Organic Light-Emitting Devices Based on para-Substituted Pyridine Carbazolylgold(III) C^C^N Complexes**
   C. Wong *et al.*, J. Am. Chem. Soc. **145**, 2638 (2023). *picoTAS*

6. **Reductive Coupling of Nitric Oxide by Cu(I): Stepwise Formation of Mono- and Dinitrosyl Species En Route to a Cupric Hyponitrite Intermediate**
   M. Bhadra *et al.*, J. Am. Chem. Soc. **145**, 2230 (2023). *CoolSpeK*

7. **Generation, Spectroscopic Characterization, and Computational Analysis of a Six-Coordinate Cobalt(III)-Imidyl Complex with an Unusual S = 3/2 Ground State that Promotes N-Group and Hydrogen Atom-Transfer Reactions with Exogenous Substrates**
   J. Yang *et al.*, J. Am. Chem. Soc. **145**, 26106 (2023). *CoolSpeK*

8. **Electronic Structure and Reactivity of Mononuclear Nonheme Iron–Peroxo Complexes as a Biomimetic Model of Rieske Oxygenases: Ring Size Effects of Macrocyclic Ligands**
   W. Zhu *et al.*, J. Am. Chem. Soc. **146**, 250 (2023). *CoolSpeK*

Science Advances

Growth of Self-Integrated Atomic Quantum Wires and Junctions of a Mott Semiconductor
T. Asaba *et al.*, Sci. Adv. **9**, eabq5661 (2023). *USM1300*

Physical Review X

Small Fermi Pockets Intertwined with Charge Stripes and Pair Density Wave Order in a Kagome Superconductor
H. Li *et al.*, Phys. Rev. X **13**, 031030 (2023). *USM1300*

ACS Catalysis

1. **Intracluster O–O Coupling Pathway Evidenced for an Anderson-Type Single-Cobalt Polymolybdate Water Oxidation Catalyst**
   N. Taira *et al.*, ACS Catal. **13**, 3211 (2023). *RSP-2000*

2. **Characterization and Reactivity of an Incredibly Reactive Intermediate in the Protonation Reaction of Dioxo-Manganese(V) Porphyrin with Acid**
   Y. Katogi *et al.*, ACS Catal. **13**, 4842 (2023). *CoolSpeK*

3. **Reversible Deactivation of Manganese Catalysts in Alkene Oxidation and H_2O_2 Disproportionation**
   J. Kasper *et al.*, ACS Catal. **13**, 6403 (2023). *CoolSpeK*

4. **Nonlinear Acid Promotion of Oxidation Reactions by Mononuclear Nonheme Iron(III)-Aqua Complexes**
   M. Nilajakar *et al.*, ACS Catal. **14**, 34 (2024). *CoolSpek, RSP-601*

Proc. Natl. Acad. Sci. USA

First Order Quantum Phase Transition in the Hybrid Metal-Mott Insulator Transition Metal Dichalcogenide 4Hb-TaS_2
A. Nayak *et al.*, PNAS **120**, e2304274120 (2023). *USM1300*

Nano Letters -1

1. **Spatially Resolving Electron Spin Resonance of π-Radical in Single-molecule Magnet**
   R. Kawaguchi *et al.*, Nano Lett. **23**, 213 (2023). *USM1300*

2. **Self-Intercalated 1T-$FeSe_2$ as an Effective Kagome Lattice**
   Z. Zhang *et al.*, Nano Lett. **23**, 954 (2023). *USM1500*

3. **Oscillatory Order–Disorder Transition during Layer-by-Layer Growth of Indium Selenide**
   Z. Chen *et al.*, Nano Lett. **23**, 1077 (2023). *USM1300*

4. **Real-Space Mapping of Local Subdegree Lattice Rotations in Low-Angle Twisted Bilayer Graphene**
   Y. Ren *et al.,* Nano Lett. **23**, 1836 (2023). *USM1300*

Tunable Spin and Valley Excitations of Correlated Insulators in Γ-Valley Moiré Bands

Foutty *et al.,* Nat. Mater. **22**, 731 (2023). Product used: USM1300

This study investigates moiré superlattices formed by transition metal dichalcogenides, specifically focusing on twisted double-bilayer WSe_2. Using a scanning single electron transistor (SET), Foutty *et al.* (Feldman group, Stanford Univ.) conducted local electronic compressibility measurements to explore electronic correlations within the moiré bands associated with the Γ-valley. The study identifies charge-ordered phases at various integer and fractional moiré fillings. The magnetic field dependence of energy gaps and chemical potential measurements upon doping reveal spin-polarized ground states with spin-polaron quasiparticle excitations. Additionally, applying a displacement field induces a metal-insulator transition by tuning between Γ- and K-valley moiré bands. The findings highlight the control over spin and valley characteristics of the correlated ground and excited states of twisted double-bilayer WSe_2

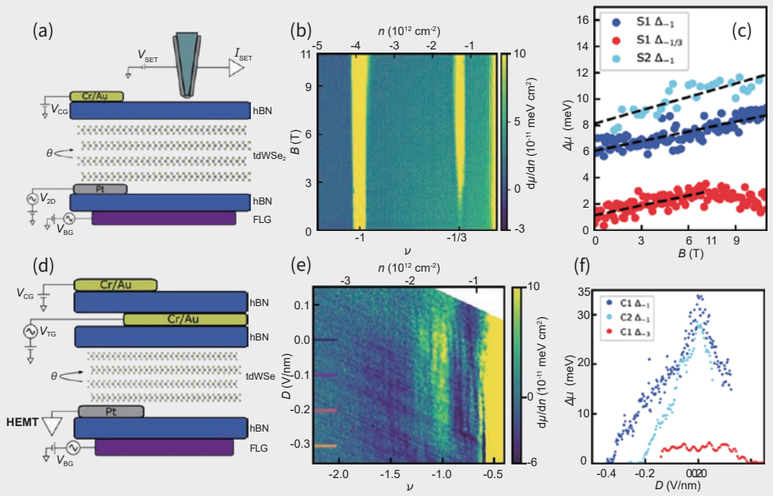


Figure
(a) Scanning SET setup.
(b) Inverse electronic compressibility $d\mu/dn$ as a function of filling factor ν and magnetic field B.
(c) Extracted charge gaps at ν=-1, -1/3 as a function of B.
(d) Dual-gated capacitance device for displacement field tuning.
(e) $d\mu/dn$ as a function of filling factor ν and displacement field D.
(f) Measured gaps at ν=-1, -1/3 as a function of D.

Electronic Nematicity Without Charge Density Waves in Titanium-based Kagome Metal

Li *et al.,* Nat. Phys. **19**, 1591 (2023). Product used: USM1300

This study investigates layered crystalline materials with transition metal atoms arranged on a kagome network, focusing on the kagome metal $CsTi_3Bi_5$, which is isostructural to the vanadium-based kagome superconductor AV_3Sb_5. It is known that, unlike AV_3Sb_5, $CsTi_3Bi_5$ does not exhibit a detectable charge density wave state. Li *et al.* (Zeljkovic group, Boston College) performed spectroscopic-imaging scanning tunneling microscopy measurements and density functional theory calculations to reveal significant electronic correlation effects at low energies. They discover an electronic anisotropy breaking the sixfold symmetry of the lattice, originating from both in-plane and out-of-plane titanium-derived d orbitals. The findings suggest a hexagonal analog of nematic bond order in Fe-based superconductors, highlighting the role of electronic orbitals in $CsTi_3Bi_5$.

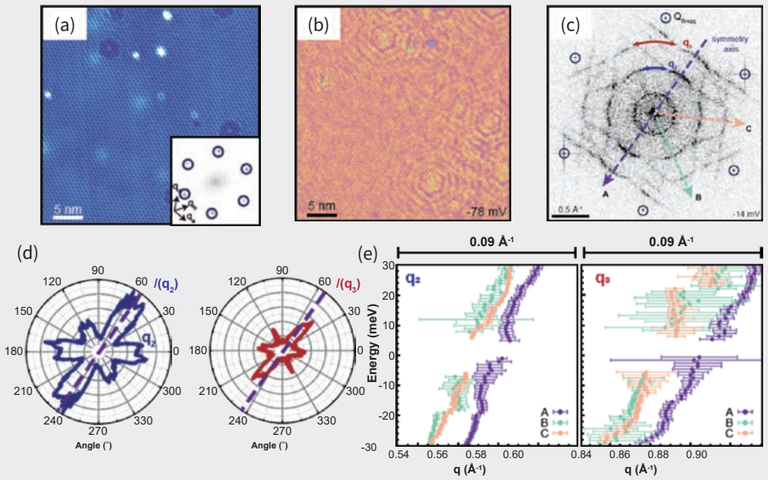


Figure
(a) STM image of Bi-terminated surface of $CsTi_3Bi_5$ showing a hexagonal lattice.
(b) Normalized conductance map showing a clear quasiparticle interference patten.
(c) Fourier transform (FT) of (b) showing two-fold symmetry.
(d) Angle-dependent FT amplitudes of q_2 and q_3 in (c).
(e) Energy dispersion of q_2 and q_3 along A, B and C in (c).

Publication List in 2023

Nano Letters -2

5. Realization of Multiple Charge-Density Waves in $NbTe_2$ at the Monolayer Limit
Y. Bai *et al.*, Nano Lett. **23**, 2107 (2023). *USM1300*

6. Giant Periodic Pseudomagnetic Fields in Strained Kagome Magnet FeSn Epitaxial Films on $SrTiO_3$(111) Substrate
H. Zhang *et al.*, Nano Lett. **23**, 2397 (2023).

7. Observation of Robust and Long-Ranged Superperiodicity of Electronic Density Induced by Intervalley Scattering in Graphene/Transition Metal Dichalcogenide Heterostructures
M. Zhang *et al.,* Nano Lett. **23**, 2630 (2023). *USM1300*

8. Real-Space Observation of Unidirectional Charge Density Wave and Complex Structural Modulation in the Pnictide Superconductor $Ba_{1-x}Sr_xNi_2As_2$
T. Qin *et al.*, Nano Lett. **23**, 2958 (2023). *USM1600*

9. Visualization of Moiré Magnons in Monolayer Ferromagnet
S. Ganguli *et al.*, Nano Lett. **23**, 3412 (2023). *USM1300*

10. Control of the Magnetic Interaction between Single-Molecule Magnet $TbPc_2$ and Superconductor $NbSe_2$ Surface by an Intercalated Co Atom
F. Ara *et al.*, Nano Lett. **23**, 6900 (2023). *USM1300*

11. Kinetics of Nanobubbles in Tiny-Angle Twisted Bilayer Graphene
C. Yan *et al.,* Nano Lett. **23**, 8532 (2023). *USM1500*

12. Moiré Enhanced Two-Band Superconductivity in a MnTe/$NbSe_2$ Heterojunction
J. Nie *et al.,* Nano Lett. **23**, 8370 (2023). *USM1300*

13. Manipulating the Spin Orientation of Co Atoms Using Monatomic Cu Chains
N. Noei *et al.*, Nano Lett. **23**, 8988 (2023). *USM1300*

14. Quantum Phase Transition in Magnetic Nanographenes on a Lead Superconductor
Y. Liu *et al.*, Nano Lett. **23**, 9704 (2023). *USM1300, JT*

15. Chiral Charge Density Wave and Backscattering-Immune Orbital Texture in Monolayer 1T-$TiTe_2$
M. Ren *et al.*, Nano Lett. **23**, 10081 (2023). *USM1500*

16. Room-Temperature Ferromagnetism in Epitaxial Bilayer FeSb/$SrTiO_3$(001) Terminated with a Kagome Lattice
H. Zhang *et al.*, Nano Lett. **24**, 122 (2023). *USM1300*

17. Melting of Unidirectional Charge Density Waves across Twin Domain Boundaries in $GdTe_3$
S. Lee *et al.*, Nano Lett. **23**, 11219 (2023). *USM1200*

Physical Review Letters

1. Phase Shift and Magnetic Anisotropy Induced Field Splitting of Impurity States in ($Li_{1-x}Fe_x$)OHFeSe Superconductor
T. Zhang *et al.*, Phys. Rev. Lett. **130**, 206001 (2023). *USM1600*

2. Real-Space Imaging of Triplon Excitations in Engineered Quantum Magnets
R. Drost *et al.,* Phys. Rev. Lett. **131**, 086701 (2023). *USM1300*

3. Probing Hidden Mott Gap and Incommensurate Charge Modulation on the Polar Surfaces of $PdCrO_2$
C. Wen *et al.,* Phys. Rev. Lett. **131**, 116501 (2023). *USM1200*

4. Squeezed Abrikosov-Josephson Vortex in Atomic-Layer Pb Superconductors Formed on Vicinal Si(111) Substrates
Y Sato *et al.*, Phys. Rev. Lett. **130**, 106002 (2023). *USM1300*

5. Oscillation of Electronic-Band-Gap Size Induced by Crystalline Symmetry Change in Ultrathin PbTe Films
K. Chang *et al.*, Phys. Rev. Lett. **131**, 016202 (2023). *USM1600*

6. Observation of Electronic Strong Correlation in VTe_2-2$\sqrt{3}$×2$\sqrt{3}$ Monolayer
W. Zhao *et al.*, Phys. Rev. Lett. **131**, 086501 (2023). *USM1600*

7. Iron Vacancy Tunable Superconductor-Insulator Transition in FeSe/$SrTiO_3$ Monolayer
C. Xue *et al.*, Phys. Rev. Lett. **131**, 256002 (2023). *USM1600*

Chemistry A European Journal

Generation and Characterization of a Tetraradical Embedded in a Curved Cyclic Paraphenylene Unit
Y. Miyazawa *et al.*, Chem. A Euro. J., **29**, e202301009, (2023). *picoTAS*

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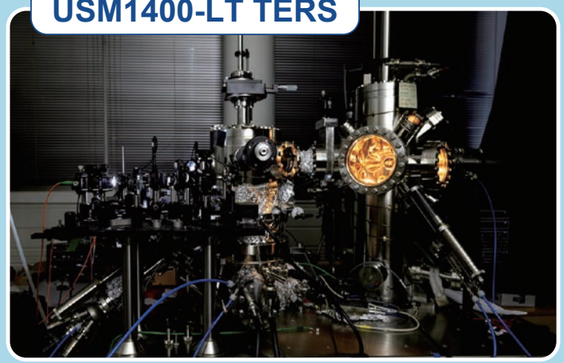
Research Interests

- STM-induced Luminescence
- Tip-enhanced Photoluminescence and Raman Spectroscopy
- Tip-enhanced Photochemistry
- Single Molecules, Atomically-precise Graphene Nanoribbons and 2D Materials

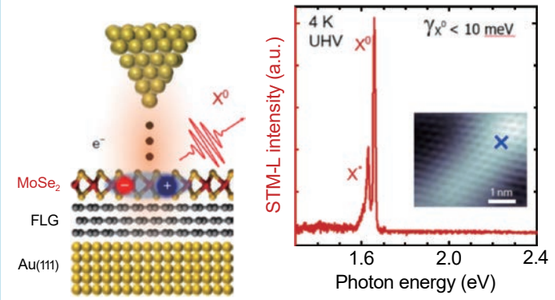
USM1400-LT TERS



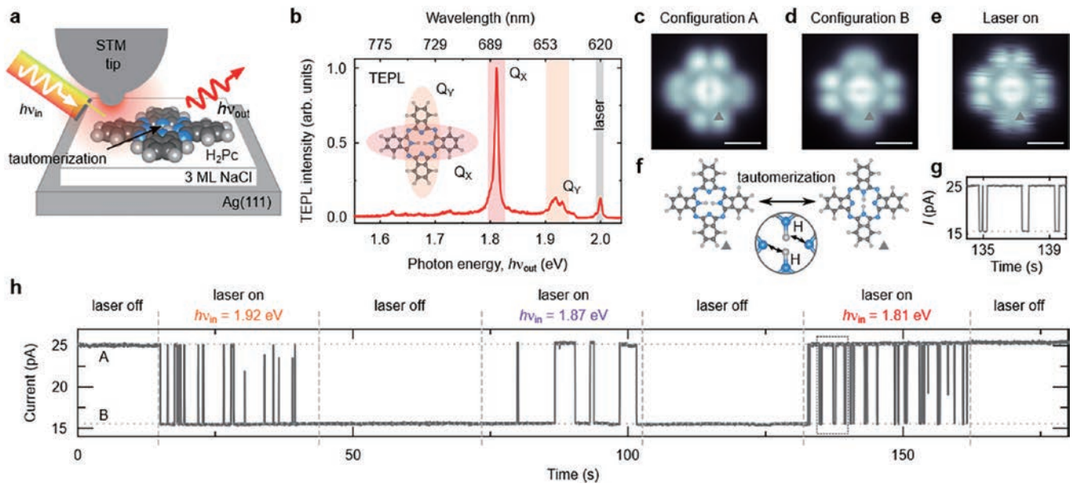
Features:

- Optimized Optical Access
- Time-Resolved Optical Detection (HanburyBrown and Twiss Setup)
- Tunable-Laser Excitation

Tip-induced Excitonicluminescence Nanoscopyof 2D Materials



Submolecular-Scalecontrol of Phototautomerization



Selected References:

(1) L. Parra E. Lopez *et al.,* Nature Materials, **22** 482 (2023).
(2) A. Rosławska *et al.,* Nature Nanotechnology, DOI: 10.1038/s41565-024-01622-4 (2024).

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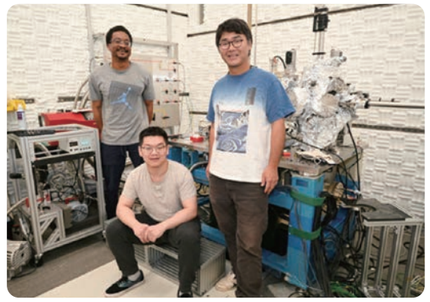
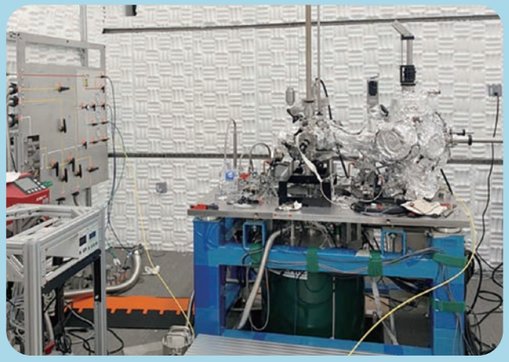
Research Interests

- Spectroscopic Imaging Scanning Tunneling Microscopy
- High Temperature Superconductivity
- Electronic Interactions and Correlated Phases
- Topological States
- van der Waals Materials and Other 2D Systems
- Moiré Superlattices and Emergent Ground/Excited States



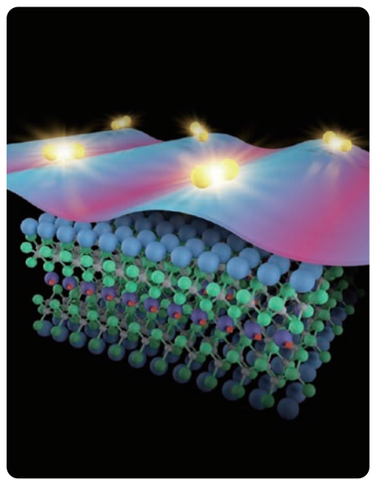
USM1300



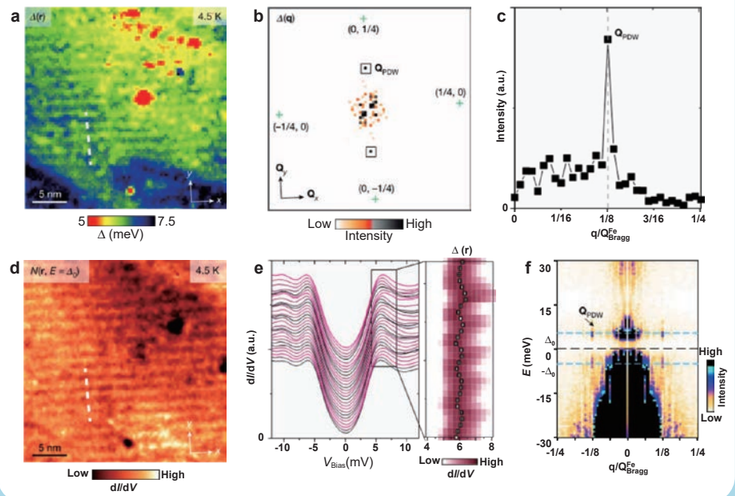
Features:

- Three Independent Contacts for Device Experiment
- 11 T Uniaxial Z-Magnet

Pair Density Wave



Spatially Modulated Gap in $EuRbFe_4As_4$



Selected References:

(1) H. Zhao, *et al.*, Nature **618**, 940 (2023).

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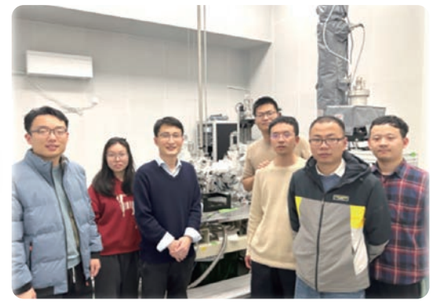
Research Interests

- Probing and Tuning Collective Electronic States in Layered Materials by Low-Temperature STM
- Atomic-Scale Spin Dynamics
- Development of Advanced STM Technique



USM1600

Features:

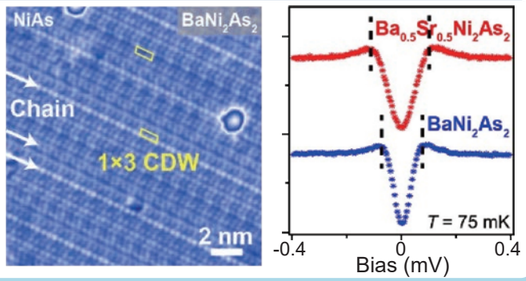
- Ultra-Low Temperature ~30 mK
- 15 T Out-of-Plane Magnet

USM1200

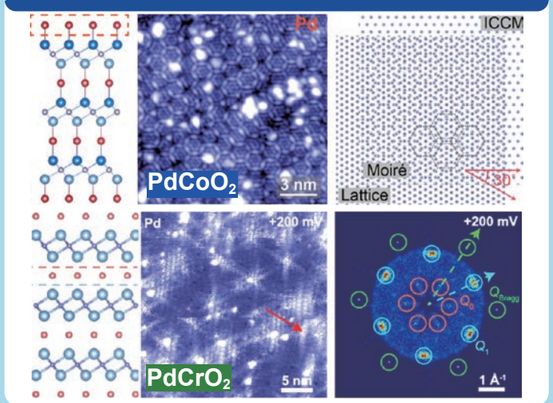
Features:

- Low-Temperature and Variable-Temperature STM
- Flexible for Laser-Coupled STM Research

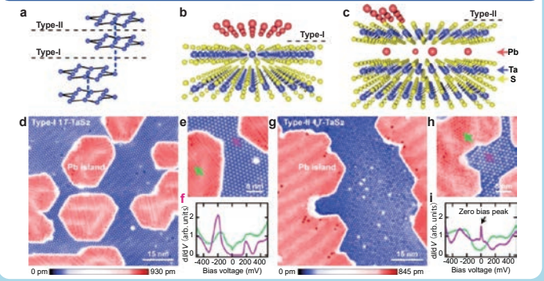
Unidirectional CDW and Complex Structure in NiAs-Based Superconductor



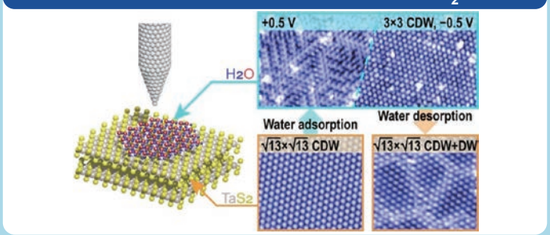
Incommensurate Charge Modulation in Delafossite Metals



Inducing and Tuning Kondo Screening in 1T-TaS_2



Water-Driven Reversible CDW Phase Transition in 1T-TaS_2



Selected References:

(1) S. Shen *et al.*, Nature Communications **13**, 2156 (2022).
(2) C. Wen, *et al.*, Physical Review Letters **126**, 256402 (2021).
(3) C. Wen, *et al.*, Physical Review Letters **131**, 116501 (2023).
(4) S. Shen, *et al.*, Nano Letters, **20**, 8854 (2020).
(5) P. Kong, *et al.*, Nano Letters, **22**, 5635 (2022).
(6) T. Qin, *et al.*, Nano Letters, **23**, 2958 (2023).

About Japanese Convenience Stores

日本でコンビニエンスストア（コンビニ）が生まれたのは1969年のことです。（諸説あり）　1975年から24時間営業が始まり、店舗数は日本全国で57,000軒を超えるほど増加し、いまや不動産情報を見れば「徒歩5分圏内コンビニ」という紹介が当たり前のように書かれるほどになりました。

Convenience stores
(Kombini)
were first established in Japan in 1969.
(There are various views.)
Since 1975, they started 24-hour
operation. Nowadays, the number of
stores has increased to more than 57,000
across Japan and it is now common
description to see
"Convenience stores within 5 minutes
walking distance"
in real estate information.

都市部では少し歩けばコンビニ、逆方向に歩いてもコンビニ、場所によってはコンビニの隣にコンビニがあり、どこでも見かける、生活に密着した商業施設となりました。

The floor area of the stores is very compact, and the products are arranged in typically the same layout in any stores. The selection is very extensive, offering lunchboxes, bread, sweets, beverages, alcohol, office supplies, and household goods. Especially for foods and beverages,

カップのお酒
内容量増量も同料金!!

Cup sake,
upsized version is
also available
at the same price!

new products are introduced every week, and you may be able to find something that reflects the seasonal occasions.
For example, in January many strawberry sweets were on display.

店舗の面積はとてもコンパクトで、どこの店も大体同じ配置で商品が並べられています。品揃えはとても充実しており、弁当、パン、スイーツ、ソフトドリンクやアルコール、事務用品や生活雑貨まで大体のものが揃います。特に食べ物と飲み物については毎週のように新商品が並び、季節を感じられるものに巡り合うことができるかもしれません。今回の特集でコンビニへ行ったときは、いちごのスイーツがたくさん並んでいました。

店内に設置されている電子レンジで買った食べ物を温めることもできますし、店舗によってはイートインコーナーが設けられていることもあります。
夜中に急にスナック菓子が食べたくなった時も、早朝にエスプレッソマシンで入れたコーヒーを飲みたくなった時も、思い立ったらすぐに手に入ります。

You can also heat up the food you buy in the microwave oven installed in the store, and some stores have eat-in corners.
When you have a sudden craving for snacks in the middle of the night or a cup of coffee made by an espresso machine in the early morning, that will come true.

宿泊するホテル内や、ホテルのすぐ近くにコンビニがあることも多いです。日本に来られた時はぜひ利用してみてください。
There are often convenience stores in the hotels or nearby the hotels. Please try Japanese convenience stores when you come to Japan.

表紙作品作家紹介

Naho Ito
イトウナホ

This is an artist who is actively engaged in their craft, based in Kyoto.
京都を拠点にご活躍されているアーティストです.