Science Newsletter

2024 Volume 1 (Total 48) *Website: http://lib.jsut.edu.cn/2018/1015/c5474a113860/page.htm,*
Jan. 2024

Contents

INTRODUCTION: 2
I TOPICS 2
ANTENNAS AND MICROWAVES 2
POWER AND ELECTRICAL ENGINEERING 5
SIGNAL PROCESSING 7
COMMUNICATION AND NETWORKS 10
ELECTRONICS MATERIALS AND DEVICES 14
IICONCENTRATION 18
PHYSICS 18
MATERIALS 19
CHEMISTRY 21
BIOLOGY 22
III CALLING FOR PAPERS 25
ACEE 2024 25
IECC 2024 27
ICMES 2024 29
SEGE 2024 30

Editor: Yue Wei（魏悦） TEL: 3548 Email: 289595883@qq.com

Introduction:

There are 3 main elements in the Science Newsletter is composed. In the first part, we provide articles about central issues for each discipline in this university, and they are provided with one subject for a time. In the second part, we select articles from the top journals in the whole science research. In the third part, we post information about calling papers for international conferences. Hopefully, some of the information in this manuscript may be useful for those who are dedicating to scientific career. Besides, the journals are also posted on the website of our library, and they are available to be accessed any time at http://lib.jsut.edu.cn/2018/1015/c5474a113860/page.htm. If there are any questions or suggestions, please send e-mails to 289595883@qq.com in no hesitate.

Ⅰ Topics

The key word of this month is **Electrical engineering.** We list several articles which are related to the top concerned topics of computer science researches. The articles are classified in 5 categories, and they are: **Antennas and Microwaves, Power and Electrical Engineering, Signal Processing, Communication and Networks and Electronics Materials and Devices**. Also, the listed articles are all arranged in a descending sort of impact factor in order to make it convenient to read. There are also links to both official site and full text for each article.

ANTENNAS AND MICROWAVES

Nature Electronics (impact factor: 34.33) 1 区

Reconfigurable microwave metadevices based on organic electrochemical transistors

Giorgio E. Bonacchini · Fiorenzo G. Omenetto

Abstract:

Electrically tunable metadevices can add novel functionalities to electronic and electromagnetic systems such as antennas and cloaking technologies. However, current microwave metadevices are based on materials that require sophisticated and expensive fabrication processes, and are not compatible with large-area and high-throughput

deposition techniques on flexible platforms. Here we report reconfigurable microwave resonators that are electrically tuned by organic electrochemical transistors. The devices are fabricated via inkjet printing onto polyimide substrates using commercial metal nanoparticle and conducting polymer inks. By applying electrostatic gating to the polymer—a mixed ion–electron conductor—we show that the amplitude and frequency of different microwave resonant structures, including individual magnetic and electric split-ring resonators as well as a metasurface, can be modulated in the sub-5-GHz range.

Applied Physics Reviews (impact factor: 15.01 1 ☒

Magnetic straintronics: Manipulating the magnetization of magnetostrictive nanomagnets with strain for energy-efficient applications

Supriyo Bandyopadhyay · Jayasimha Atulasimha · Anjan Barman

Abstract:

The desire to perform information processing, computation, communication, signal generation, and related tasks, while dissipating as little energy as possible, has inspired many ideas and paradigms. One of the most powerful among them is the notion of using magnetostrictive nanomagnets as the primitive units of the hardware platforms and manipulating their magnetizations (which are the state variables encoding information) with electrically generated static or time-varying mechanical strain to elicit myriad functionalities. This approach has two advantages. First, information can be retained in the devices after powering off since the nanomagnets are nonvolatile unlike charge-based devices, such as transistors. Second, the energy expended to perform a given task is exceptionally low since it takes very little energy to alter magnetization states with strain. This field is now known as "straintronics," in analogy with electronics, spintronics, valleytronics, etc., although it pertains specifically to "magnetic" straintronics and excludes phenomena involving non-magnetic systems. We review the recent advances and trends in straintronics, including digital information processing (logic), information storage (memory), domain wall devices operated with strain, control of skyrmions with strain, non-Boolean computing and machine learning with straintronics, signal generation (microwave sources) and communication (ultra-miniaturized acoustic and electromagnetic antennas) implemented with strained nanomagnets, hybrid straintronics–magnonics, and interaction between phonons and magnons in straintronic systems. We identify key challenges and opportunities, and lay out pathways to advance this field to the point where it might become a mainstream technology for energy-efficient systems.

Advanced Science (impact factor: 15.12) 1 ☒

High‐Efficiency Spatial‐Wave Frequency Multiplication Using Strongly Nonlinear Metasurface

Hai Peng Wang · Yun Bo Li · Shi Yu Wang, et.al

Abstract:
In the past decades, metasurfaces have opened up a promising venue for manipulating lights and electromagnetic (EM) waves. In the field of nonlinearity, second-harmonic generation (SHG) is a research focus due to its diverse applications. There have been many researches for realizing SHG in optical regime using nonlinear characteristics of optical materials, but its efficiency is low. In microwave frequencies, SHGs are basically studied in the guided-wave systems. Here, high-efficiency SHGs of spatial waves are presented in the microwave frequency using nonlinear metasurface loaded with active chips at the subwavelength scale. The nonlinear meta-atom is composed of receiving antenna, transmitting antenna, and active circuit of frequency multiplier, which can realize strongly nonlinear response and link the EM signals from the receiving to transmitting antennas. Correspondingly, to achieve the function of spatial-wave frequency multiplication, the working frequency of the transmitting antenna in the meta-atom should be twice as that of the receiving antenna, and hence the active chip is well matched to obtain the signal transforming with high efficiency. Good performance of the spatial-wave frequency multiplication is demonstrated in the proof-of-concept experiments with the best transform efficiency of 85.11% under normal incidence, validating the proposed method.

Proceedings of the IEEE (impact factor: 20.63) 1 ☒

Advances in Wirelessly Powered Backscatter Communications: From Antenna/RF Circuitry Design to Printed Flexible Electronics

Chaoyun Song · Yuan Ding · Aline Eid, et.al

Abstract:
Backscatter communication is an emerging paradigm for pervasive connectivity of low-power communication devices. Wirelessly powered backscattering wireless sensor networks (WSNs) become particularly important to meet the upcoming era of the Internet of Things (IoT), which requires the massive deployment of self-sustainable and maintenance-free low-cost sensing and communication devices. This article will introduce the state-of-the-art antenna design and radio frequency (RF) system integration for wirelessly powered backscatter communications, covering both the node and the base unit. We capture the latest development in ultralow-power RF front ends and coding schemes for μW -level backscatter modulators, as well as the latest progress in wireless power transfer (WPT) and energy harvesting (EH) techniques. Newly emerged rectenna system, waveform design, and channel optimization are reviewed in light of the opportunities for adaptively optimizing the WPT/EH efficiency for low-power signals with varying conditions. In addition, advanced device packaging and integration technologies in, e.g., additively manufactured RF components and modules for microwave and millimeter-wave ubiquitous sensing and backscattering energy-autonomous RF structures are reported. Inkjet printing for the sustainable and ultralow-

cost fabrication of flexible RF devices and sensors will be reviewed to provide a prospective insight into the future packaging of backscatter communications from the chip-level design to complete system integration. Finally, this article will also address the challenges in fully wireless powered backscatter radio networks and discuss the future directions of backscatter communication in terms of “Green IoT” and “Low Carbon” smart home, smart city, smart skin, and machine-to-machine (M2M) applications.

Power and Electrical Engineering

Chemical Society Reviews (impact factor: 46.23) 1 ☒

Atomic/molecular layer deposition for energy storage and conversion

Yang Zhao · Lei Zhang · Jian Liu et.al

Abstract:
Energy storage and conversion systems, including batteries, supercapacitors, fuel cells, solar cells, and photoelectrochemical water splitting, have played vital roles in the reduction of fossil fuel usage, addressing environmental issues and the development of electric vehicles. The fabrication and surface/interface engineering of electrode materials with refined structures are indispensable for achieving optimal performances for the different energy-related devices. Atomic layer deposition (ALD) and molecular layer deposition (MLD) techniques, the gas-phase thin film deposition processes with self-limiting and saturated surface reactions, have emerged as powerful techniques for surface and interface engineering in energy-related devices due to their exceptional capability of precise thickness control, excellent uniformity and conformity, tunable composition and relatively low deposition temperature. In the past few decades, ALD and MLD have been intensively studied for energy storage and conversion applications with remarkable progress. In this review, we give a comprehensive summary of the development and achievements of ALD and MLD and their applications for energy storage and conversion, including batteries, supercapacitors, fuel cells, solar cells, and photoelectrochemical water splitting. Moreover, the fundamental understanding of the mechanisms involved in different devices will be deeply reviewed. Furthermore, the large-scale potential of ALD and MLD techniques is discussed and predicted. Finally, we will provide insightful perspectives on future directions for new material design by ALD and MLD and untapped opportunities in energy storage and conversion.

Energy & Environmental Science (impact factor: 32.51) 1 ☒

Enabling Storage and Utilization of Low-Carbon Electricity: Power to Formic Acid

Sudipta Chatterjee · Indranil Dutta · Yanwei Lum et.al

Abstract:
Formic acid has been proposed as a hydrogen energy carrier because of its many desirable properties, such as low toxicity and flammability, and a high volumetric hydrogen storage capacity of 53 g H2 L−1 under ambient conditions. Compared to

liquid hydrogen, formic acid is thus more convenient and safer to store and transport. Converting formic acid to power has been demonstrated in direct formic acid fuel cells and in dehydrogenation reactions to supply hydrogen for polymer electrolyte membrane fuel cells. However, to enable a complete cycle for the storage and utilization of low-carbon or carbon-free electricity, processes for the hydrogenation and electrochemical reduction of carbon dioxide (CO2) to formic acid, namely power to formic acid, are needed. In this review, representative homogenous and heterogeneous catalysts for CO2 hydrogenation will be summarized. Apart from catalytic systems for CO2 hydrogenation, a wide range of catalysts, electrodes, and reactor systems for the electrochemical CO2 reduction reaction (eCO2RR) will be discussed. An analysis for practical applications from the engineering viewpoint will be provided with concluding remarks and an outlook for future challenges and R&D directions.

Joule (impact factor: 39.84) 1 ☒

4-fold enhancement in energy scavenging from fluctuating thermal resources using a temperature-doubler circuit

Mitchell Westwood · Xiaodong Zhao · Zhen Chen et.al

Abstract:
Oscillating thermal resources are ubiquitous thanks to the diurnal cycle and are also found in nonsolar settings. Yet in isolation, oscillating thermal resources cannot normally generate electricity because standard heat engines require two thermal terminals, a source and a sink, and hence the engine's second terminal is typically connected to some nearby constant-temperature reservoir. As an alternative, here we introduce the "temperature doubler" thermal circuit, based on two thermal diodes and two thermal capacitances. Modeling reveals how the electrical power output depends on the thermal diodes and masses. Benchtop experiments match the modeling well with no free parameters. Experiments further show that the temperature doubler generates four times more electricity than a conventional approach using a static heat sink, with a theoretical limit of an 8-fold enhancement for perfect thermal diodes and large thermal masses. This study shows how high-performance nonlinear thermal elements enable new approaches to more effective thermal-to-electrical energy conversion.

Nature Nanotechnology (impact factor: 38.33) 1 ☒

Anisotropic band flattening in graphene with one-dimensional superlattices

Yutao Li · Scott Dietrich · Carlos Forsythe et. al

Editor: Yue Wei（魏悦） TEL: 3548 Email: 289595883@qq.com

Abstract:
Patterning graphene with a spatially periodic potential provides a powerful means to modify its electronic properties1,2,3. In particular, in twisted bilayers, coupling to the resulting moiré superlattice yields an isolated flat band that hosts correlated many-body phases4,5. However, both the symmetry and strength of the effective moiré potential are constrained by the constituent crystals, limiting its tunability. Here, we have exploited the technique of dielectric patterning6 to subject graphene to a one-dimensional electrostatic superlattice (SL)1. We observed the emergence of multiple Dirac cones and found evidence that with increasing SL potential the main and satellite Dirac cones are sequentially flattened in the direction parallel to the SL basis vector, behaviour resulting from the interaction between the one-dimensional SL electric potential and the massless Dirac fermions hosted by graphene. Our results demonstrate the ability to induce tunable anisotropy in high-mobility two-dimensional materials, a long-desired property for novel electronic and optical applications7,8. Moreover, these findings offer a new approach to engineering flat energy bands where electron interactions can lead to emergent properties9.

SIGNAL PROCESSING

Nature Methods (impact factor: 48.01) 1 ☒

SciPy 1.0: fundamental algorithms for scientific computing in Python

Pauli Virtanen · Ralf Gommers · Travis E. Oliphant et.al

Abstract:
SciPy is an open-source scientific computing library for the Python programming language. Since its initial release in 2001, SciPy has become a de facto standard for leveraging scientific algorithms in Python, with over 600 unique code contributors, thousands of dependent packages, over 100,000 dependent repositories and millions of downloads per year. In this work, we provide an overview of the capabilities and development practices of SciPy 1.0 and highlight some recent technical developments.

Main:
SciPy is a library of numerical routines for the Python programming language that provides fundamental building blocks for modeling and solving scientific problems. SciPy includes algorithms for optimization, integration, interpolation, eigenvalue problems, algebraic equations, differential equations and many other classes of problems; it also provides specialized data structures, such as sparse matrices and k-dimensional trees. SciPy is built on top of NumPy1,2, which provides array data structures and related fast numerical routines, and SciPy is itself the foundation upon which higher level scientific libraries, including scikit-learn3 and scikit-image4, are built. Scientists, engineers and others around the world rely on SciPy. For example, published scripts5,6 used in the analysis of gravitational waves7,8 import several subpackages of SciPy, and the M87 black hole imaging project cites SciPy9.

Recently, SciPy released version 1.0, a milestone that traditionally signals a library's API (application programming interface) being mature enough to be trusted in production pipelines. This version numbering convention, however, belies the history of a project that has become the standard others follow and has seen extensive adoption in research and industry.

SciPy's arrival at this point is surprising and somewhat anomalous. When started in 2001, the library had little funding and was written mainly by graduate students—many of them without a computer science education and often without the blessing of their advisors. To even imagine that a small group of 'rogue' student programmers could upend the already well-established ecosystem of research software—backed by millions in funding and many hundreds of highly qualified engineers10,11,12—was preposterous.

Yet the philosophical motivations behind a fully open tool stack, combined with an excited, friendly community with a singular focus, have proven auspicious in the long run. They led not only to the library described in this paper, but also to an entire ecosystem of related packages (https://wiki.python.org/moin/NumericAndScientific) and a variety of social activities centered around them (https://wiki.python.org/moin/PythonConferences). The packages in the SciPy ecosystem share high standards of implementation, documentation and testing, and a culture eager to learn and adopt better practices—both for community management and software development.

Nature Reviews Clinical Oncology (impact factor: 78.81) 1 区

Broadening horizons: the role of ferroptosis in cancer

Xin Chen · Rui Kang · Guido Kroemer et.al

Abstract:

The discovery of regulated cell death processes has enabled advances in cancer treatment. In the past decade, ferroptosis, an iron-dependent form of regulated cell death driven by excessive lipid peroxidation, has been implicated in the development and therapeutic responses of various types of tumours. Experimental reagents (such as erastin and RSL3), approved drugs (for example, sorafenib, sulfasalazine, statins and artemisinin), ionizing radiation and cytokines (such as IFNγ and TGFβ1) can induce ferroptosis and suppress tumour growth. However, ferroptotic damage can trigger inflammation-associated immunosuppression in the tumour microenvironment, thus favouring tumour growth. The extent to which ferroptosis affects tumour biology is unclear, although several studies have found important correlations between mutations in cancer-relevant genes (for example, RAS and TP53), in genes encoding proteins involved in stress response pathways (such as NFE2L2 signalling, autophagy and hypoxia) and the epithelial-to-mesenchymal transition, and responses to treatments that activate ferroptosis. Herein, we present the key molecular mechanisms of ferroptosis, describe the crosstalk between ferroptosis and tumour-associated signalling pathways, and discuss the potential applications of ferroptosis in the context of systemic therapy, radiotherapy and immunotherapy.

Nature (impact factor: 64.84) 1 区

Cell-programmed nutrient partitioning in the tumour microenvironment

Bradley I. Reinfeld · Matthew Z. Madden · Melissa M et.al

Abstract:

Cancer cells characteristically consume glucose through Warburg metabolism1, a process that forms the basis of tumour imaging by positron emission tomography (PET). Tumour-infiltrating immune cells also rely on glucose, and impaired immune cell metabolism in the tumour microenvironment (TME) contributes to immune evasion by tumour cells2,3,4. However, whether the metabolism of immune cells is dysregulated in the TME by cell-intrinsic programs or by competition with cancer cells for limited nutrients remains unclear. Here we used PET tracers to measure the access to and uptake of glucose and glutamine by specific cell subsets in the TME. Notably, myeloid cells had the greatest capacity to take up intratumoral glucose, followed by T cells and cancer cells, across a range of cancer models. By contrast, cancer cells showed the highest uptake of glutamine. This distinct nutrient partitioning was programmed in a cell-intrinsic manner through mTORC1 signalling and the expression of genes related to the metabolism of glucose and glutamine. Inhibiting glutamine uptake enhanced glucose uptake across tumour-resident cell types, showing that glutamine metabolism suppresses glucose uptake without glucose being a limiting factor in the TME. Thus, cell-intrinsic programs drive the preferential acquisition of glucose and glutamine by immune and cancer cells, respectively. Cell-selective partitioning of these nutrients could be exploited to develop therapies and imaging strategies to enhance or monitor the metabolic programs and activities of specific cell populations in the TME.

Nature (impact factor: 64.84) 1 区

Dysregulation of brain and choroid plexus cell types in severe COVID-19

Andrew C. Yang · Fabian Kern · Patricia M. Losada et.al

Abstract

Although SARS-CoV-2 primarily targets the respiratory system, patients with and survivors of COVID-19 can suffer neurological symptoms1,2,3. However, an unbiased understanding of the cellular and molecular processes that are affected in the brains of patients with COVID-19 is missing. Here we profile 65,309 single-nucleus transcriptomes from 30 frontal cortex and choroid plexus samples across 14 control individuals (including 1 patient with terminal influenza) and 8 patients with COVID-19. Although our systematic analysis yields no molecular traces of SARS-CoV-2 in the brain, we observe broad cellular perturbations indicating that barrier cells of the choroid plexus sense and relay peripheral inflammation into the brain and show that peripheral T cells infiltrate the parenchyma. We discover microglia and astrocyte subpopulations associated with COVID-19 that share features with pathological cell states that have previously been reported in human neurodegenerative disease4,5,6. Synaptic signalling

of upper-layer excitatory neurons—which are evolutionarily expanded in humans7 and linked to cognitive function8—is preferentially affected in COVID-19. Across cell types, perturbations associated with COVID-19 overlap with those found in chronic brain disorders and reside in genetic variants associated with cognition, schizophrenia and depression. Our findings and public dataset provide a molecular framework to understand current observations of COVID-19-related neurological disease, and any such disease that may emerge at a later date.

Nature Reviews Cancer (impact factor: 78.53) 1 ☒

Antigen presentation in cancer: insights into tumour immunogenicity and immune evasion

Suchit Jhunjhunwala · Christian Hammer · Lélia Delamarre

Abstract

Immune checkpoint blockade, which blocks inhibitory signals of T cell activation, has shown tremendous success in treating cancer, although success still remains limited to a fraction of patients. To date, clinically effective CD8+ T cell responses appear to target predominantly antigens derived from tumour-specific mutations that accumulate in cancer, also called neoantigens. Tumour antigens are displayed on the surface of cells by class I human leukocyte antigens (HLA-I). To elicit an effective antitumour response, antigen presentation has to be successful at two distinct events: first, cancer antigens have to be taken up by dendritic cells (DCs) and cross-presented for CD8+ T cell priming. Second, the antigens have to be directly presented by the tumour for recognition by primed CD8+ T cells and killing. Tumours exploit multiple escape mechanisms to evade immune recognition at both of these steps. Here, we review the tumour-derived factors modulating DC function, and we summarize evidence of immune evasion by means of quantitative modulation or qualitative alteration of the antigen repertoire presented on tumours. These mechanisms include modulation of antigen expression, HLA-I surface levels, alterations in the antigen processing and presentation machinery in tumour cells. Lastly, as complete abrogation of antigen presentation can lead to natural killer (NK) cell-mediated tumour killing, we also discuss how tumours can harbour antigen presentation defects and still evade NK cell recognition.

Communication and Networks

Science (impact factor: 56.91) 1 ☒

Accurate prediction of protein structures and interactions using a three-track neural network

Minkyung Baek · Frank DiMaio · Ivan Anishchenko, et.al

Abstract

DeepMind presented notably accurate predictions at the recent 14th Critical Assessment of Structure Prediction (CASP14) conference. We explored network architectures that incorporate related ideas and obtained the best performance with a three-track network in which information at the one-dimensional (1D) sequence level, the 2D distance map level, and the 3D coordinate level is successively transformed and integrated. The three-track network produces structure predictions with accuracies approaching those of DeepMind in CASP14, enables the rapid solution of challenging x-ray crystallography and cryo–electron microscopy structure modeling problems, and provides insights into the functions of proteins of currently unknown structure. The network also enables rapid generation of accurate protein-protein complex models from sequence information alone, short-circuiting traditional approaches that require modeling of individual subunits followed by docking. We make the method available to the scientific community to speed biological research.

Lancet (impact factor: 168.94) 1 ☒

Establishing a service improvement network to increase access to care and improve treatment outcomes in community mental health: a series of retrospective cohort studies

Joshua Eusty Jonathan Buckman · Rob Saunders · John Cape et.al

Abstract

Background

National reports using aggregate data have demonstrated that referrals to improving access to psychological therapies (IAPT) services increase year-on-year, but some groups struggle to access the services and outcomes are variable. To identify moderators of access and outcomes, individual patient data are required to control for confounding factors and mitigate ecological biases, and a collaborative effort is needed to carry through findings to local policy and practice. We created a network of services for these purposes.

Methods

As part of the network, a dataset was formed using routinely collected anonymised data from all individual patients referred to eight IAPT services across the north, central, and east London areas, UK (total population n=483 683; mean age 37·83 years [SD 14·40]; female n=311 790 [66·25%], male n=158 860 [33·75%]; Black and minority ethnic n=137 373 [35·40%], White n=250 740 [64·60%]). Cohort studies were done using pre-treatment clinical, sociodemographic, treatment-related, and care pathway data, to investigate the effects of service-level changes to care, and identify groups for whom there are inequalities in access or poorer treatment outcomes. Primary analyses involved regression modelling and propensity score matching. NHS ethical approval was not required for this study (confirmed by the Health Research Authority July 2020,

reference number 81/81). The data were provided by the IAPT services for evaluation as part of a wider service improvement project conducted in accordance with the procedures of the host institution and the NHS Trusts which operate the IAPT services (project reference 00519-IAPT).

Findings

After adjustment for all available confounders, increases in the number of treatment sessions received per patient (odds ratio 1·09, 95% CI 1·08–1·10), reductions in non-attended sessions (0·85, 0·84–0·86), and matching treatments to diagnoses (based on National Institute for Health and Care Excellence guidelines) were associated with better odds of symptomatic remission (0·91, 0·88–0·95). Furthermore, people aged 65 years and older had better outcomes than younger patients (1·33, 1·24–1·43), but were under-represented, and people younger than 25 years not in employment, education, or training (NEETS) had worse outcomes (0·68, 0·63–0·74). Social gradients were observed: people living in the least deprived areas had considerably better outcomes than those in more deprived areas, despite similar levels of access to care and referrals (1·28, 1·07–1·53). Consequently, the services improved the system of appointment reminders to reduce non-attendance, offered training and consultations to staff on matching treatment to diagnoses, and have set up initiatives to encourage more referrals of older adults and improve access and outcomes for NEETS.

Interpretation

These studies demonstrate the value in appropriate data sharing aimed specifically at service improvement. Collaboration between services can better inform potential area-level modification to treatment pathways to improve access and care for adults with depression and anxiety.

Nature (impact factor: 64.84) 1 区

An integrated space-to-ground quantum communication network over 4,600 kilometres

Yu-Ao Chen · Qiang Zhang · Teng-Yun Chen, et.al

Abstract

Quantum key distribution (QKD)1,2 has the potential to enable secure communication and information transfer3. In the laboratory, the feasibility of point-to-point QKD is evident from the early proof-of-concept demonstration in the laboratory over 32 centimetres4; this distance was later extended to the 100-kilometre scale5,6 with decoy-state QKD and more recently to the 500-kilometre scale7,8,9,10 with measurement-device-independent QKD. Several small-scale QKD networks have also been tested outside the laboratory11,12,13,14. However, a global QKD network requires a practically (not just theoretically) secure and reliable QKD network that can be used by a large number of users distributed over a wide area15. Quantum repeaters16,17 could

in principle provide a viable option for such a global network, but they cannot be deployed using current technology18. Here we demonstrate an integrated space-to-ground quantum communication network that combines a large-scale fibre network of more than 700 fibre QKD links and two high-speed satellite-to-ground free-space QKD links. Using a trusted relay structure, the fibre network on the ground covers more than 2,000 kilometres, provides practical security against the imperfections of realistic devices, and maintains long-term reliability and stability. The satellite-to-ground QKD achieves an average secret-key rate of 47.8 kilobits per second for a typical satellite pass—more than 40 times higher than achieved previously. Moreover, its channel loss is comparable to that between a geostationary satellite and the ground, making the construction of more versatile and ultralong quantum links via geosynchronous satellites feasible. Finally, by integrating the fibre and free-space QKD links, the QKD network is extended to a remote node more than 2,600 kilometres away, enabling any user in the network to communicate with any other, up to a total distance of 4,600 kilometres.

Cell (impact factor: 64.51) 1 区

Massive expansion of human gut bacteriophage diversity

Luis F Camarillo-Guerrero · Alexandre Almeida · Guillermo Rangel-Pineros, et al

Abstract

Quantum key distribution (QKD)1,2 has the potential to enable secure communication and information transfer3. In the laboratory, the feasibility of point-to-point QKD is evident from the early proof-of-concept demonstration in the laboratory over 32 centimetres4; this distance was later extended to the 100-kilometre scale5,6 with decoy-state QKD and more recently to the 500-kilometre scale7,8,9,10 with measurement-device-independent QKD. Several small-scale QKD networks have also been tested outside the laboratory11,12,13,14. However, a global QKD network requires a practically (not just theoretically) secure and reliable QKD network that can be used by a large number of users distributed over a wide area15. Quantum repeaters16,17 could in principle provide a viable option for such a global network, but they cannot be deployed using current technology18. Here we demonstrate an integrated space-to-ground quantum communication network that combines a large-scale fibre network of more than 700 fibre QKD links and two high-speed satellite-to-ground free-space QKD links. Using a trusted relay structure, the fibre network on the ground covers more than 2,000 kilometres, provides practical security against the imperfections of realistic devices, and maintains long-term reliability and stability. The satellite-to-ground QKD achieves an average secret-key rate of 47.8 kilobits per second for a typical satellite pass—more than 40 times higher than achieved previously. Moreover, its channel loss is comparable to that between a geostationary satellite and the ground, making the construction of more versatile and ultralong quantum links via geosynchronous satellites feasible. Finally, by integrating the fibre and free-space QKD links, the QKD network is extended to a remote node more than 2,600 kilometres away, enabling any

user in the network to communicate with any other, up to a total distance of 4,600 kilometres.

Science (impact factor: 56.91) 1 ☒

Effect of natural mutations of SARS-CoV-2 on spike structure, conformation, and antigenicity

Sophie M-C Gobeil · Katarzyna Janowska · Shana McDowell, et.al

Abstract

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) variants with multiple spike mutations enable increased transmission and antibody resistance. We combined cryo–electron microscopy (cryo-EM), binding, and computational analyses to study variant spikes, including one that was involved in transmission between minks and humans, and others that originated and spread in human populations. All variants showed increased angiotensin-converting enzyme 2 (ACE2) receptor binding and increased propensity for receptor binding domain (RBD)–up states. While adaptation to mink resulted in spike destabilization, the B.1.1.7 (UK) spike balanced stabilizing and destabilizing mutations. A local destabilizing effect of the RBD E484K mutation was implicated in resistance of the B.1.1.28/P.1 (Brazil) and B.1.351 (South Africa) variants to neutralizing antibodies. Our studies revealed allosteric effects of mutations and mechanistic differences that drive either interspecies transmission or escape from antibody neutralization.

ELECTRONICS MATERIALS AND DEVICES

Science (impact factor: 56.91) 1 ☒

The world of two-dimensional carbides and nitrides (MXenes)

Armin VahidMohammadi · Johanna Rosen · Yury Gogotsi

Abstract

A decade after the first report, the family of two-dimensional (2D) carbides and nitrides (MXenes) includes structures with three, five, seven, or nine layers of atoms in an ordered or solid solution form. Dozens of MXene compositions have been produced, resulting in MXenes with mixed surface terminations. MXenes have shown useful and tunable electronic, optical, mechanical, and electrochemical properties, leading to applications ranging from optoelectronics, electromagnetic interference shielding, and wireless antennas to energy storage, catalysis, sensing, and medicine. Here we present a forward-looking review of the field of MXenes. We discuss the challenges to be addressed and outline research directions that will deepen the fundamental understanding of the properties of MXenes and enable their

hybridization with other 2D materials in various emerging technologies.

Chemical Reviews (impact factor: 62.12) 1 ☒

Dynamic Covalent Polymer Networks: A Molecular Platform for Designing Functions beyond Chemical Recycling and Self-Healing

Ning Zheng · Yang Xu · Qian Zhao, et.al

Abstract:

Dynamic covalent polymer networks (DCPN) have historically attracted attention for their unique roles in chemical recycling and self-healing, which are both relevant for sustainable societal development. Efforts in these directions have intensified in the past decade with notable progress in newly discovered dynamic covalent chemistry, fundamental material concepts, and extension toward emerging applications including energy and electronic devices. Beyond that, the values of DCPN in discovering/designing functional properties not offered by classical thermoplastic and thermoset polymers have recently gained traction. In particular, the dynamic bond exchangeability of DCPN has shown unparalleled design versatility in various areas including shape-shifting materials/devices, artificial muscles, and microfabrication. Going beyond this basic bond exchangeability, various molecular mechanisms to manipulate network topologies (topological transformation) have led to opportunities to program polymers, with notable concepts such as living networks and topological isomerization. In this review, we provide an overview of the above progress with particular focuses on molecular design strategies for the exploitation of functional material properties. Based on this, we point out the remaining issues and offer perspectives on how this class of materials can shape the future in ways that are complementary with classical thermoplastic and thermoset polymers.

Chemical Reviews (impact factor:62.12) 1 ☒

Electroceramics for High-Energy Density Capacitors: Current Status and Future Perspectives

Ge Wang · Zhilun Lu · Yong Li, et al

Abstract:

Materials exhibiting high energy/power density are currently needed to meet the growing demand of portable electronics, electric vehicles and large-scale energy storage devices. The highest energy densities are achieved for fuel cells, batteries, and supercapacitors, but conventional dielectric capacitors are receiving increased attention for pulsed power applications due to their high power density and their fast charge–discharge speed. The key to high energy density in dielectric capacitors is a large maximum but small remanent (zero in the case of linear dielectrics) polarization and a

high electric breakdown strength. Polymer dielectric capacitors offer high power/energy density for applications at room temperature, but above 100 °C they are unreliable and suffer from dielectric breakdown. For high-temperature applications, therefore, dielectric ceramics are the only feasible alternative. Lead-based ceramics such as La-doped lead zirconate titanate exhibit good energy storage properties, but their toxicity raises concern over their use in consumer applications, where capacitors are exclusively lead free. Lead-free compositions with superior power density are thus required. In this paper, we introduce the fundamental principles of energy storage in dielectrics. We discuss key factors to improve energy storage properties such as the control of local structure, phase assemblage, dielectric layer thickness, microstructure, conductivity, and electrical homogeneity through the choice of base systems, dopants, and alloying additions, followed by a comprehensive review of the state-of-the-art. Finally, we comment on the future requirements for new materials in high power/energy density capacitor applications.

Nature (impact factor: 64.81) 1 ☒

Large-area display textiles integrated with functional systems

Xiang Shi · Yong Zuo · Peng Zhai, et.al

Abstract:

Displays are basic building blocks of modern electronics1,2. Integrating displays into textiles offers exciting opportunities for smart electronic textiles—the ultimate goal of wearable technology, poised to change the way in which we interact with electronic devices3,4,5,6. Display textiles serve to bridge human–machine interactions7,8,9, offering, for instance, a real-time communication tool for individuals with voice or speech difficulties. Electronic textiles capable of communicating10, sensing11,12 and supplying electricity13,14 have been reported previously. However, textiles with functional, large-area displays have not yet been achieved, because it is challenging to obtain small illuminating units that are both durable and easy to assemble over a wide area. Here we report a 6-metre-long, 25-centimetre-wide display textile containing 5 × 105 electroluminescent units spaced approximately 800 micrometres apart. Weaving conductive weft and luminescent warp fibres forms micrometre-scale electroluminescent units at the weft–warp contact points. The brightness between electroluminescent units deviates by less than 8 per cent and remains stable even when the textile is bent, stretched or pressed. Our display textile is flexible and breathable and withstands repeated machine-washing, making it suitable for practical applications. We show that an integrated textile system consisting of display, keyboard and power supply can serve as a communication tool, demonstrating the system's potential within the 'internet of things' in various areas, including healthcare. Our approach unifies the fabrication and function of electronic devices with textiles, and we expect that woven-fibre materials will shape the next generation of electronics.

Editor: Yue Wei（魏悦） TEL: 3548 Email: 289595883@qq.com

Nature (impact factor: 64.84) 1 区

Self-powered soft robot in the Mariana Trench

Guorui Li · Xiangping Chen · Fanghao Zhou, et.al

Abstract:

The deep sea remains the largest unknown territory on Earth because it is so difficult to explore1,2,3,4. Owing to the extremely high pressure in the deep sea, rigid vessels5,6,7 and pressure-compensation systems8,9,10 are typically required to protect mechatronic systems. However, deep-sea creatures that lack bulky or heavy pressure-tolerant systems can thrive at extreme depths11,12,13,14,15,16,17. Here, inspired by the structure of a deep-sea snailfish15, we develop an untethered soft robot for deep-sea exploration, with onboard power, control and actuation protected from pressure by integrating electronics in a silicone matrix. This self-powered robot eliminates the requirement for any rigid vessel. To reduce shear stress at the interfaces between electronic components, we decentralize the electronics by increasing the distance between components or separating them from the printed circuit board. Careful design of the dielectric elastomer material used for the robot's flapping fins allowed the robot to be actuated successfully in a field test in the Mariana Trench down to a depth of 10,900 metres and to swim freely in the South China Sea at a depth of 3,224 metres. We validate the pressure resilience of the electronic components and soft actuators through systematic experiments and theoretical analyses. Our work highlights the potential of designing soft, lightweight devices for use in extreme conditions.

Editor: Yue Wei（魏悦） TEL: 3548 Email: 289595883@qq.com

Ⅱ Concentration

PHYSICS

Magnetosheath jets at Jupiter and across the solar system

Zhou, Yufei, Raptis, et al.

Abstract

The study of jets in the Earth's magnetosheath has been a subject of extensive investigation for over a decade due to their profound impact on the geomagnetic environment and their close connection with shock dynamics. While the variability of the solar wind and its interaction with Earth's magnetosphere provide valuable insights into jets across a range of parameters, a broader parameter space can be explored by examining the magnetosheath of other planets. Here we report the existence of anti-sunward and sunward jets in the Jovian magnetosheath and show their close association with magnetic discontinuities. The anti-sunward jets are possibly generated by a shock–discontinuity interaction. Finally, through a comparative analysis of jets observed at Earth, Mars, and Jupiter, we show that the size of jets scales with the size of bow shock.

Possible Meissner effect near room temperature in copper-substituted lead apatite

Hongyang Wang, Yao Yao, Ke Shi, et al.

Abstract

With copper-substituted lead apatite below room temperature, we observe diamagnetic dc magnetization under magnetic field of 25 Oe with remarkable bifurcation between zero-field-cooling and field-cooling measurements, and under 200 Oe it changes to be paramagnetism. A glassy memory effect is found during cooling. Typical hysteresis loops for superconductors are detected below 250 K, along with an asymmetry between forward and backward sweep of magnetic field. Our experiment suggests at room temperature the Meissner effect is possibly present in this material.

Excitonic Interactions and Mechanism for Ultrafast Interlayer Photoexcited Response in van der Waals Heterostructures

Chen Hu, Mit H. Naik, Yang-Hao Chan, et al.

Abstract

Optical dynamics in van der Waals heterobilayers is of fundamental scientific and practical interest. Based on a time-dependent adiabatic GW approach, we discover a new many-electron (excitonic) channel for converting photoexcited intralayer to interlayer excitations and the associated ultrafast optical responses in heterobilayers, which is conceptually different from the conventional single-particle picture. We find strong electron-hole interactions drive the dynamics and enhance the pump-probe optical responses by an order of magnitude with a rise time of ∼300 fs in MoSe2/WSe2 heterobilayers, in agreement with experiment.

MATERIALS

Ultrahigh-mobility semiconducting epitaxial graphene on silicon carbide

Zhao, Jian, Ji, et al.

Abstract

Semiconducting graphene plays an important part in graphene nanoelectronics because of the lack of an intrinsic bandgap in graphene1. In the past two decades, attempts to modify the bandgap either by quantum confinement or by chemical functionalization failed to produce viable semiconducting graphene. Here we demonstrate that semiconducting epigraphene (SEG) on single-crystal silicon carbide substrates has a band gap of 0.6 eV and room temperature mobilities exceeding 5,000 cm2 V−1 s−1, which is 10 times larger than that of silicon and 20 times larger than that of the other two-dimensional semiconductors. It is well known that when silicon evaporates from silicon carbide crystal surfaces, the carbon-rich surface crystallizes to produce graphene multilayers2. The first graphitic layer to form on the silicon-terminated face of SiC is an insulating epigraphene layer that is partially covalently bonded to the SiC surface3. Spectroscopic measurements of this buffer layer4 demonstrated semiconducting signatures4, but the mobilities of this layer were limited because of disorder5. Here we demonstrate a quasi-equilibrium annealing method that produces SEG (that is, a well-ordered buffer layer) on macroscopic atomically flat terraces. The SEG lattice is aligned with the SiC substrate. It is chemically, mechanically and thermally robust and can be patterned and seamlessly connected to semimetallic epigraphene using conventional semiconductor fabrication techniques. These essential properties make SEG suitable for nanoelectronics.

F-Doped Calcium Silicate Enabling Fast Ion Deposition Kinetics for Highly Reversible Zinc Metal Batteries

Abstract

Aqueous zinc ion batteries (AZIBs) are subject to various unwanted side reactions, including dendrite growth, hydrogen evolution, and corrosion passivation, due to the highly active Zn anode. While constructing an artificial interface layer (AIL) can address these problems, the compromise in Zn deposition kinetics is considerable. Herein, F-doped modified hydrated calcium silicate (F-CSH) nanosheets are designed to enhance Zn2+ ion deposition kinetics. Combined with theoretical calculations, it is verified that the F-doped contributes to higher interface adsorption energy with Zn metal and lower ion diffusion barrier, favoring faster charge transfer compared to non-F-doped counterparts. Additionally, the strong interaction between zincophilic F and Zn facilitates rapid desolvation of Zn2+ and promotes the deposition between the Zn metal and F-CSH interphases. As a result, the F-CSH layer maintains the stability on the Zn surface, enabling fast and reversible Zn deposition. The F-CSH@Zn anode exhibits a long lifespan of over 2800 h at 5 mA cm−2, while running more than 2500 cycles at a ≈100% Coulombic efficiency. This work highlights the importance of constructing AIL with strong interaction with Zn2+/Zn in improving the interphase kinetics of zinc anode for realizing the stability of AZIBs.

Negative mixing enthalpy solid solutions deliver high strength and ductility

An, Zibing, Li, et al.

Abstract

Body-centred cubic refractory multi-principal element alloys (MPEAs), with several refractory metal elements as constituents and featuring a yield strength greater than one gigapascal, are promising materials to meet the demands of aggressive structural applications1,2,3,4,5,6. Their low-to-no tensile ductility at room temperature, however, limits their processability and scaled-up application7,8,9,10. Here we present a HfNbTiVAl10 alloy that shows remarkable tensile ductility (roughly 20%) and ultrahigh yield strength (roughly 1,390 megapascals). Notably, these are among the best synergies compared with other related alloys. Such superb synergies derive from the addition of aluminium to the HfNbTiV alloy, resulting in a negative mixing enthalpy solid solution, which promotes strength and favours the formation of hierarchical chemical fluctuations (HCFs). The HCFs span many length scales, ranging from submicrometre to atomic scale, and create a high density of diffusive boundaries that act as effective barriers for dislocation motion. Consequently, versatile dislocation configurations are sequentially stimulated, enabling the alloy to accommodate plastic deformation while fostering substantial interactions that give rise to two unusual strain-hardening rate upturns. Thus, plastic instability is significantly delayed, which expands the plastic regime as ultralarge tensile ductility. This study provides valuable insights into achieving a synergistic combination of ultrahigh strength and large tensile ductility

in MPEAs.

CHEMISTRY

Direct propylene epoxidation via water activation over Pd-Pt electrocatalysts

Minju Chung , Joseph H. Maalouf , Jason S. Adams, et al.

Abstract

Direct electrochemical propylene epoxidation by means of water-oxidation intermediates presents a sustainable alternative to existing routes that involve hazardous chlorine or peroxide reagents. We report an oxidized palladium-platinum alloy catalyst (PdPtOx/C), which reaches a Faradaic efficiency of 66 ± 5% toward propylene epoxidation at 50 milliamperes per square centimeter at ambient temperature and pressure. Embedding platinum into the palladium oxide crystal structure stabilized oxidized platinum species, resulting in improved catalyst performance. The reaction kinetics suggest that epoxidation on PdPtOx/C proceeds through electrophilic attack by metal-bound peroxo intermediates. This work demonstrates an effective strategy for selective electrochemical oxygen-atom transfer from water, without mediators, for diverse oxygenation reactions.

Electronic paddle-wheels in a solid-state electrolyte

Dhattarwal, Harender S., Somni, et al.

Abstract

Solid-state superionic conductors (SSICs) are promising alternatives to liquid electrolytes in batteries and other energy storage technologies. The rational design of SSICs and ultimately their deployment in battery technologies is hindered by the lack of a thorough understanding of their ion conduction mechanisms. In SSICs containing molecular ions, rotational dynamics couple with translational diffusion to create a paddle-wheel effect that facilitates conduction. The paddle-wheel mechanism explains many important features of molecular SSICs, but an explanation for ion conduction and anharmonic lattice dynamics in SSICs composed of monatomic ions is still needed. We predict that ion conduction in the classic SSIC AgI involves electronic paddle-wheels, rotational motion of localized electron pairs that couples to and facilitates ion diffusion. The electronic paddle-wheel mechanism creates a universal perspective for understanding ion conductivity in both monatomic and molecular SSICs that will create

design principles for engineering solid-state electrolytes from the electronic level up to the macroscale.

Vitamin C-induced CO2 capture enables high-rate ethylene production in CO2 electroreduction

Kim, Jongyoun, Lee, et al.

Abstract

High-rate production of multicarbon chemicals via the electrochemical CO2 reduction can be achieved by efficient CO2 mass transport. A key challenge for C−C coupling in high-current-density CO2 reduction is how to promote *CO formation and dimerization. Here, we report molecularly enhanced CO2-to-*CO conversion and *CO dimerization for high-rate ethylene production. Nanoconfinement of ascorbic acid by graphene quantum dots enables immobilization and redox reversibility of ascorbic acid in heterogeneous electrocatalysts. Cu nanowire with ascorbic acid nanoconfined by graphene quantum dots (cAA-CuNW) demonstrates high-rate ethylene production with a Faradaic efficiency of 60.7% and a partial current density of 539 mA/cm2, a 2.9-fold improvement over that of pristine CuNW. Furthermore, under low CO2 ratio of 33%, cAA-CuNW still exhibits efficient ethylene production with a Faradaic efficiency of 41.8%. We find that cAA-CuNW increases *CO coverage and optimizes the *CO binding mode ensemble between atop and bridge for efficient C−C coupling. A mechanistic study reveals that ascorbic acid can facilitate *CO formation and dimerization by favorable electron and proton transfer with strong hydrogen bonding.

BIOLOGY

Disease-driven top predator decline affects mesopredator population genomic structure

Beer, Marc A., Proft, et al.

Abstract

Top predator declines are pervasive and often have dramatic effects on ecological communities via changes in food web dynamics, but their evolutionary consequences are virtually unknown. Tasmania's top terrestrial predator, the Tasmanian devil, is declining due to a lethal transmissible cancer. Spotted-tailed quolls benefit via mesopredator release, and they alter their behaviour and resource use concomitant with devil declines and increased disease duration. Here, using a landscape community genomics framework to identify environmental drivers of population genomic structure

and signatures of selection, we show that these biotic factors are consistently among the top variables explaining genomic structure of the quoll. Landscape resistance negatively correlates with devil density, suggesting that devil declines will increase quoll genetic subdivision over time, despite no change in quoll densities detected by camera trap studies. Devil density also contributes to signatures of selection in the quoll genome, including genes associated with muscle development and locomotion. Our results provide some of the first evidence of the evolutionary impacts of competition between a top predator and a mesopredator species in the context of a trophic cascade. As top predator declines are increasing globally, our framework can serve as a model for future studies of evolutionary impacts of altered ecological interactions.

Environmental variability directly affects the prevalence of divorce in monogamous albatrosses

Francesco Ventura, José Pedro Granadeiro, Paul M. Lukacs, et al.

Abstract

In many socially monogamous species, divorce is a strategy used to correct for sub-optimal partnerships and is informed by measures of previous breeding performance. The environment affects the productivity and survival of populations, thus indirectly affecting divorce via changes in demographic rates. However, whether environmental fluctuations directly modulate the prevalence of divorce in a population remains poorly understood. Here, using a longitudinal dataset on the long-lived black-browed albatross (Thalassarche melanophris) as a model organism, we test the hypothesis that environmental variability directly affects divorce. We found that divorce rate varied across years (1% to 8%). Individuals were more likely to divorce after breeding failures. However, regardless of previous breeding performance, the probability of divorce was directly affected by the environment, increasing in years with warm sea surface temperature anomalies (SSTA). Furthermore, our state-space models show that warm SSTA increased the probability of switching mates in females in successful relationships. For the first time, to our knowledge, we document the disruptive effects of challenging environmental conditions on the breeding processes of a monogamous population, potentially mediated by higher reproductive costs, changes in phenology and physiological stress. Environmentally driven divorce may therefore represent an overlooked consequence of global change.

A suppressor screen in C. elegans identifies a multiprotein interaction that stabilizes the synaptonemal complex

Lisa E. Kursel, Jesus E. Aguayo Martinez, and Ofer Rog

Abstract

Successful chromosome segregation into gametes depends on tightly regulated interactions between the parental chromosomes. During meiosis, chromosomes are aligned end-to-end by an interface called the synaptonemal complex, which also regulates exchanges between them. However, despite the functional and ultrastructural conservation of this essential interface, how protein–protein interactions within the synaptonemal complex regulate chromosomal interactions remains poorly understood. Here, we describe a genetic interaction in the C. elegans synaptonemal complex, comprised of short segments of three proteins, SYP-1, SYP-3, and SYP-4. We identified the interaction through a saturated suppressor screen of a mutant that destabilizes the synaptonemal complex. The specificity and tight distribution of suppressors suggest a charge-based interface that promotes interactions between synaptonemal complex subunits and, in turn, allows intimate interactions between chromosomes. Our work highlights the power of genetic studies to illuminate the mechanisms that underlie meiotic chromosome interactions.

Editor: Yue Wei（魏悦） TEL: 3548 Email: 289595883@qq.com

Ⅲ Calling for papers

ACEE 2024

Submission deadline:	**Feb 5, 2024**
Conference date:	**Apr 19, 2024 - Apr 21, 2024**
Full name:	**CPS--2024 2nd Asia Conference on Electronics Engineering**
Location:	**Singapore**
Website:	http://www.acee.net/

Nowadays, we are surrounded by electronic devices in our everyday lives, such as, phones, computer, etc. The electronic devices have become an indispensable part of our lives. At the situation, 2024 2nd Asia Conference on Electronics Engineering (ACEE 2024) will be held in Singapore during April 19-21, 2024. It aims to bring together researchers in the related areas, which devoted their work to push the development of electronics engineering.
The conference topics include several tracks, such as, Electronics, Control and Computer Systems, Telecommunication Engineering, Computer Engineering, etc. ACEE 2024 conference seeks papers presenting significant and novel research results on emerging electronics engineering and its applications. We especially encourage submissions that present novel experimentation, creative use of electronic technologies, and new insights made possible using analysis. We invite submissions on a wide range of electronics engineering's topics. Welcome you to submit the paper or abstract!

Topics of interest for submission include, but are not limited to:

- Track 1. Electronics:
  * Microelectronic System
  * Electronic Materials
  * Radio Frequency Integrated Circuit Design (RFIC)
  * Analog Integrated Circuit Design

- Track 2. Control and Computer Systems:
  * Optimal, Robust and Adaptive Controls
  * Non Linear and Stochastic Controls
  * Modeling and Identification
  * Image Based Control

- Track 3. Telecommunication Engineering:
  * Antenna and Wave Propagation
  * Modulation and Signal Processing for Telecommunication
  * Wireless and Mobile Communications

Editor: Yue Wei（魏悦） TEL: 3548 Email: 289595883@qq.com

* Information Theory and Coding

- Track 4. Computer Engineering:
  * Computer Architecture
  * Parallel and Distributed Computer
  * Pervasive Computing
  * Computer Network
  * Embedded System

- Track 5. Imaging and Sensor Engineering:
  * Medical Imaging
  * Magnetic Resonance Imaging (MRI)
  * Cancer Detection and Imaging of Margins
  * Real-time Imaging and Video Processing

More Topics, please visit at： http://www.acee.net/cfp.html

Editor: Yue Wei（魏悦） TEL: 3548 Email: 289595883@qq.com

IECC 2024

Submission deadline:	**Feb 10, 2024**
Conference date:	**Jul 19, 2024 - Jul 21, 2024**
Full name:	**2024 6th International Electronics Communication Conference**
Location:	**Fukuoka, Japan**
Website:	http://www.iecc.net/

2024 6th International Electronics Communication Conference (IECC 2024) will be held during July 19-21, 2024 in Fukuoka, Japan. IECC 2024 is supported by Singapore Institute of Electronics, Feng Chia University, China and some other universities and Societies. This conference is meant for researchers from academia, industries and research & development organizations all over the globe interested in the areas of Electronics Communication. It will put special emphasis on the participations of PhD students, Postdoctoral fellows and other young researchers from all over the world. It would be beneficial to bring together a group of experts from diverse fields to discuss recent progress and to share ideas on open questions. The conference will feature world-class keynote speakers in the main areas.

The IECC 2024 will present the most recent and exciting advances in Electronics Communication through keynote talks. Prospective authors are invited to submit papers on relevant algorithms and applications including, but not limited to:

Communication Technologies
Digital communication technologies
Satellite communication technologies
Wireless network communication technologies
Mobile communication
Mobile Ad-hoc networks
Computer network communications
Communication modeling theories and practices.
5G communication and networks
Green communication systems
Network and information security techniques
Multimedia communication frameworks
Microwave communication networks and technologies

Electronics
Digital Electronics
Power and applied electronics
Electro technologies
Nanoelectronics and microelectronics
Semiconductor technologies
Power electronics and drive systems

Editor: Yue Wei（魏悦） TEL: 3548 Email: 289595883@qq.com

Power systems reliability and security
Real-time systems
Cognitive electronics
Applied electronics
Advanced VLSI systems
Advanced computer architectures
Embedded processors and networking
Artificial Intelligence and expert systems
Navigational electronics
Mechatronics
Vehicular Electronics
Instrumentation and Control
Power Electronics & Circuits
Biomedical Electronics and Bioengineering
Bioelectronics
IT-Convergence
Renewable Energy
Car & Aviation IT

Other Topics

Editor: Yue Wei（魏悦） TEL: 3548 Email: 289595883@qq.com

ICMES 2024

Submission deadline:	**Feb 25, 2024**
Conference date:	**Jul 12, 2024 - Jul 14, 2024**
Full name:	**2024 the 9th International Conference on Mechatronics and Electrical Systems (ICMES 2024)**
Location:	**Xiangyang, China**
Website:	http://www.icmes.org/

The 9th International Conference on Mechatronics and Electrical Systems (ICMES 2024) will be held in Xiangyang, China from July 12-14, 2024. It's sponsored by Hubei University of Arts and Science, hoted by Computer School of Hubei University of Arts and Science. On behalf of the conference committees, it is our pleasure and honor to invite prospective authors initiating the discussion on the challenges that need to be timely overcome and addressing key questions for achieving a safe, reliable, sustainable and intelligent power system.

Topic about Mechatronics and Electrical Systems:

- Advances in Aerospace and Automotive
- Agrotechnology
- Applied Sciences and Biosciences
- Biomechanics and Medical Technology
- Electrical and Electronic System
- Control, Robotics And Mechatronics
- Artificial Intelligence and Intelligent Control
- Social Science Studies Related to Engineering and Technology
- Mechatronics Applications in Cyber-physical Systems
- Diagnosis and Monitoring in Mechatronic Systems
- Strategic and Defence Technology
- Structural and Environment Engineering
- Transportation Systems
- Tribology

- More Topics, please visit at http://www.icmes.org/topics.html.

Editor: Yue Wei（魏悦） TEL: 3548 Email: 289595883@qq.com

SEGE 2024

Submission deadline:	**Feb 25, 2024**
Conference date:	**Aug 18, 2024 - Aug 20, 2024**
Full name:	**2024 IEEE the 12th International Conference on Smart Energy Grid Engineering**
Location:	**Ontario Tech University, Oshawa, Canada**
Website:	http://www.ieee-sege.com/

It is our great pleasure to invite you to join our International Conference on Smart Energy Grid Engineering (SEGE), which is sponsored by Toronto Section NPS Chapter and hosted by Ontario Tech University. This event will provide unique opportunity to have fruitful discussions about smart energy grid infrastructures, technologies, engineering design methods, and best practices that address industrial challenges. The event includes large number of speakers and quality papers that cover energy generation, transmission and distribution infrastructures, energy storage, electrification, information and communications, and security. 2024 IEEE the 12th International Conference on Smart Energy Grid Engineering (SEGE 2024) will be held during August 18-20 in 2024. We look forward to welcoming you at Ontario Tech University, Oshawa, Canada.

Topics of interest include but not limited to the following:

Resilient / adaptive grid infrastructures design, planning, operation and management
Thermal networks, storage, import / export, control, optimization, and applications
Hydrogen and natural gas networks, production and supply chain, integration
Gas-power generation systems design and applications
Power Electronic converters and drives
Energy storage technologies and systems
Demand monitoring and energy Efficient Systems
FACTS, active power filters, power quality monitoring and performance enhancement
Sensors, communications and network
Grid modeling, simulation, and data management
Energy efficiency, conservation, and savings
Plug-in Hybrid Electric Vehicle (PHEV) systems, CNG Vehicles, clean Energy
Grid protection, reliability, energy / power quality and maintenance
Smart metering, measurement, instrumentation, and control
Information, security and privacy
Renewable energy, wind, solar, fuel cells and distributed generation within microgrids
Computational intelligence and optimization
Smart homes, cities, communities
Life cycle assessment, pricing, policies, and energy planning
Effects of climate change on health and the society
Smart energy grid education.

Editor: Yue Wei（魏悦） TEL: 3548 Email: 289595883@qq.com