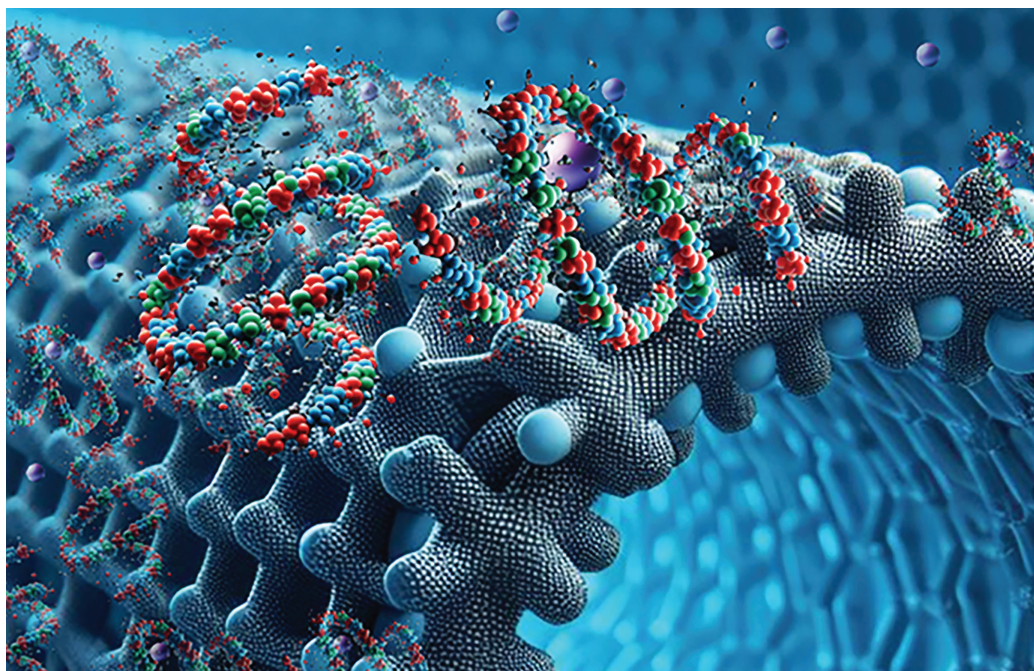


Challenges and prospects in organic photonics and electronics

Osaka City Central Public Hall,
Osaka, Japan

6 – 8th November 2023



FARADAY DISCUSSIONS

Volume 250, 2024



The Faraday Community for Physical Chemistry of the Royal Society of Chemistry, previously the Faraday Society, was founded in 1903 to promote the study of sciences lying between chemistry, physics and biology.

Editorial Staff

Executive Editor

Michael A. Rowan

Deputy Editor

Vikki Pritchard

Development Editors

Bee Hockin, Andrea Carolina Ojeda Porras

Editorial Production Manager

Gisela Scott

Senior Publishing Editor

Robin Brabham

Publishing Editors

Isobel Darlington and Emma Gorrell

Editorial Assistant

Daphne Houston

Publishing Assistants

Lee Colwill and Rob Griffiths

Publisher

Jeanne Andres

Faraday Discussions (Print ISSN 1359-6640, Electronic ISSN 1364-5498) is published 8 times a year by the Royal Society of Chemistry, Thomas Graham House, Science Park, Milton Road, Cambridge, UK CB4 0WE.

Volume 250 ISBN 978-1-83767-275-2

2024 annual subscription price: print+electronic £1272

US \$2240; electronic only £1212, US \$2133.

Customers in Canada will be subject to a surcharge to cover GST.

Customers in the EU subscribing to the electronic version only will be charged VAT.

All orders, with cheques made payable to the Royal Society of Chemistry, should be sent to the Royal Society of Chemistry Order Department, Royal Society of Chemistry, Thomas Graham House, Science Park, Milton Road, Cambridge, CB4 0WE, UK
Tel +44 (0)1223 432398; E-mail orders@rsc.org

If you take an institutional subscription to any Royal Society of Chemistry journal you are entitled to free, site-wide web access to that journal. You can arrange access via Internet Protocol (IP) address at www.rsc.org/ip

Customers should make payments by cheque in sterling payable on a UK clearing bank or in US dollars payable on a US clearing bank.

Whilst this material has been produced with all due care, the Royal Society of Chemistry cannot be held responsible or liable for its accuracy and completeness, nor for any consequences arising from any errors or the use of the information contained in this publication. The publication of advertisements does not constitute any endorsement by the Royal Society of Chemistry or Authors of any products advertised. The views and opinions advanced by contributors do not necessarily reflect those of the Royal Society of Chemistry which shall not be liable for any resulting loss or damage arising as a result of reliance upon this material. The Royal Society of Chemistry is a charity, registered in England and Wales, Number 207890, and a company incorporated in England by Royal Charter (Registered No. RC000524), registered office: Burlington House, Piccadilly, London W1J 0BA, UK, Telephone: +44 (0) 207 4378 6556.

Printed in the UK



Faraday Discussions

Faraday Discussions are unique international discussion meetings that focus on rapidly developing areas of chemistry and its interfaces with other scientific disciplines.

Scientific Committee volume 250

Chair

Youhei Takeda, Osaka University, Japan

Committee

Przemyslaw Data, Lodz University, Poland
Birgit Esser, Ulm University, Germany
Aiko Fukazawa, Kyoto University, Japan
Peter Skabara, Glasgow University, UK
Natalie Stingelin, Georgia Tech University, United States and Imperial College London, UK
Nobuhiro Yanai, Kyushu University, Japan

Faraday Standing Committee on Conferences

Chair

Susan Perkin, University of Oxford, UK

Secretary

Susan Weatherby, Royal Society of Chemistry, UK

George Booth, King's College London, UK

Rachel Evans, University of Cambridge, UK

David Fermin, University of Bristol, UK

Dwayne Heard, University of Leeds, UK

David Lennon, University of Glasgow, UK

Angelos Michaelides, University College London, UK

Julia Weinstein, University of Sheffield, UK

Advisory Board

Vic Arcus, The University of Waikato, New Zealand

Timothy Easun, Cardiff University, UK

Dirk Guld, University of Erlangen-Nuremberg, Germany

Marina Kuimova, Imperial College London, UK

Luis Liz-Marzán, CIC biomaGUNE, Spain

Andrew Mount, University of Edinburgh, UK

Frank Neese, Max Planck Institute for Chemical Energy Conversion, Germany

Michel Orrit, Leiden University, The Netherlands

Zhong-Qun Tian, Xiamen University, China

Siva Umapathy, Indian Institute of Science, Bangalore, India

Bert Weckhuysen, Utrecht University, The Netherlands

Julia Weinstein, University of Sheffield, UK

Sihai Yang, University of Manchester, UK

Information for Authors

This journal is © the Royal Society of Chemistry 2024 Apart from fair dealing for the purposes of research or private study for non-commercial purposes, or criticism or review, as permitted under the Copyright, Designs and Patents Act 1988 and the Copyright and Related Rights Regulation 2003, this publication may only be reproduced, stored or transmitted, in any form or by any means, with the prior permission in writing of the Publishers or in the case of reprographic reproduction in accordance with the terms of licences issued by the Copyright Licensing Agency in the UK. US copyright law is applicable to users in the USA.

© The paper used in this publication meets the requirements of ANSI/NISO Z39.48-1992 (Permanence of Paper).

Registered charity number: 207890

Challenges and prospects in organic photonics and electronics

Faraday Discussions

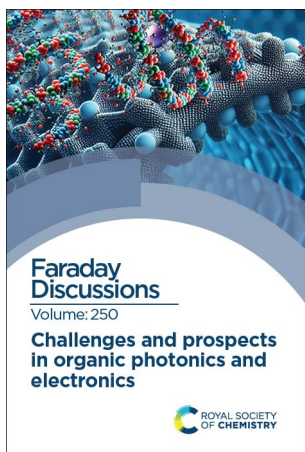
www.rsc.org/faraday_d

A General Discussion on Challenges and prospects in organic photonics and electronics was held in Osaka, Japan on the 6th, 7th and 8th of November 2023.

The Royal Society of Chemistry is the world's leading chemistry community. Through our high impact journals and publications we connect the world with the chemical sciences and invest the profits back into the chemistry community.

CONTENTS

ISSN 1359-6640; ISBN 978-1-83767-275-2



Cover

See Nako *et al.*, *Faraday Discuss.*, 2024, **250**, 43–59.

Small-molecule sensing on flexible biosensors *via* integration of structure-switching aptamers on polymer-coated carbon nanotubes.

Image reproduced by permission of Bajramshahe Shkodra from *Faraday Discuss.*, 2024, **250**, 43–59.

INTRODUCTORY LECTURE

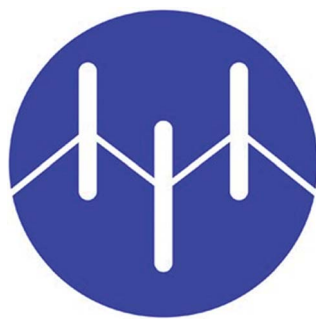
- 9 Spiers Memorial Lecture: Challenges and prospects in organic photonics and electronics**
Michele Catacchio, Mariapia Caputo, Lucia Sarcina, Cecilia Scandurra, Angelo Tricase, Verdiana Marchianò, Eleonora Macchia, Paolo Bollella and Luisa Torsi

PAPERS AND DISCUSSIONS

- 43 Polymeric integration of structure-switching aptamers on transistors for histamine sensing**
Bajramshahe Shkodra, Mattia Petrelli, Kyung-Ae Yang, Anna Tagliaferri, Paolo Lugli, Luisa Petti and Nako Nakatsuka



SPONSORS



The Japan Society of Applied Physics



POSTER SPONSORSHIP



**Journal of
Materials Chemistry C**



- 60 **An organic transistor for detecting the oxidation of an organic sulfur compound at a solid–liquid interface and its chemical sensing applications**
Yui Sasaki, Yijing Zhang, Kohei Ohshiro, Kazuhiko Tsuchiya, Xiaojun Lyu, Masao Kamiko, Yoshinori Ueno, Hikaru Tanaka and Tsuyoshi Minami
- 74 **The unexpected fast polymerization during the synthesis of a glycolated polythiophene**
Abdulrahman Bakry, Preeti Yadav, Shin-Ya (Emerson) Chen and Christine K. Luscombe
- 83 **Organic neuromorphics and bioelectronics: general discussion**
- 96 **Optoelectronic conversion and polarization hysteresis in organic MISM and MISIM devices with DA-type single-component molecules**
Akihiro Tomimatsu, Rie Suizu, Miyabi Nakazawa, Takashi Shirahata, Yohji Misaki, Naoya Kinoshita and Kunio Awaga
- 110 **A phenazine-based conjugated microporous polymer as a high performing cathode for aluminium–organic batteries**
Rebecca Grieco, Olivera Luzanin, Diego Alvan, Marta Liras, Robert Dominko, Nagaraj Patil, Jan Bitenc and Rebeca Marcilla
- 129 **Reducing undesired solubility of squarephaneic tetraimide for use as an organic battery electrode material**
Bowen Ding, Manik Bhosale, Troy L. R. Bennett, Martin Heeney, Felix Plasser, Birgit Esser and Florian Glöcklhofer
- 145 **Organic batteries: general discussion**
- 162 **Singlet fission is incoherent in pristine orthorhombic single crystals of rubrene: no evidence of triplet-pair emission**
David G. Bossanyi, Maik Matthiesen, Rahul Jayaprakash, Sayantan Bhattacharya, Jana Zaumseil and Jenny Clark
- 181 **Excited-state dynamics of C₃-symmetric heptazine-based thermally activated delayed-fluorescence emitters**
Katrina Bergmann and Zachary M. Hudson
- 192 **Effects of halogen atom substitution on luminescent radicals: a case study on tris(2,4,6-trichlorophenyl)methyl radical-carbazole dyads**
Kazuhiro Nakamura, Kenshiro Matsuda, Rui Xiaotian, Minoru Furukori, Satoshi Miyata, Takuya Hosokai, Kosuke Anraku, Kohei Nakao and Ken Albrecht
- 202 **Morphology, dynamic disorder, and charge transport in an indoloindole-based hole-transporting material from a multi-level theoretical approach**
Manuel Pérez-Escribano, Alberto Fernández-Alarcón, Enrique Ortí, Juan Aragón, Jesús Cerdá and Joaquín Calbo
- 220 **Green-light wavelength-selective organic solar cells for agrivoltaics: dependence of wavelength on photosynthetic rate**
Seihou Jinnai, Naoto Shimohara, Kazunori Ishikawa, Kento Hama, Yohei Iimuro, Takashi Washio, Yasuyuki Watanabe and Yutaka Ie
- 233 **Luminescence mechanism analysis of a TADF molecule showing peculiar thermal behavior**
Youichi Tsuchiya, Keito Mizukoshi, Masaki Saigo, Tomohiro Ryu, Kiyoshi Miyata, Ken Onda and Chihaya Adachi



- 251 Photocatalytic CO₂ reduction by topologically matched polymer–polymer heterojunction nanosheets**
Catherine M. Aitchison, Yu Zhang, Wanpeng Lu and Iain McCulloch
- 263 Diluted PEDOT:PSS for high-performance organic light-emitting devices with thermally activated delayed fluorescence emitters**
Hui Fang, Xiaoyun Chen, Jinliang Lin, Jiale Li, Qin Xue and Guohua Xie
- 271 Amplified spontaneous emission from a liquid crystalline phase: anisotropic property and active modulation**
Yusuke Tsutsui, Tsuneaki Sakurai and Shu Seki
- 281 Spectrally narrow band-edge photoluminescence from AgInS₂-based core/shell quantum dots for electroluminescence applications**
Taro Uematsu, Ryunosuke Izumi, Shoki Sugano, Riku Sugano, Tatsuya Hirano, Genichi Motomura, Tsukasa Torimoto and Susumu Kuwabata
- 298 Excitonic organic materials for photochemical and optoelectronic applications: general discussion**
- 335 High-performance n-type organic thermoelectrics enabled by modulating cyano-functionalized polythiophene backbones**
Junwei Wang, Suxiang Ma, Sang Young Jeong, Wanli Yang, Jianfeng Li, Young Woo Han, Kui Feng and Xugang Guo
- 348 Single-crystalline oligomer-based conductors modeling the doped poly(3,4-ethylenedioxythiophene) family**
Tomoko Fujino, Ryohei Kameyama, Kota Onozuka, Kazuki Matsuo, Shun Dekura, Kazuyoshi Yoshimi and Hatsumi Mori
- 361 Giant Seebeck effect over 0.1V K⁻¹ – is this an intrinsic phenomenon in organic semiconductors?**
Masakazu Nakamura, Hirotaka Kojima, Ryo Abe, Yongyoon Cho, Shotaro Hayashi and Masahiro Hiramoto
- 377 Controlling the thermoelectric properties of organo-metallic coordination polymers through backbone geometry**
Zilu Liu, Md Azimul Haque, Chris N. Savory, Tianjun Liu, Satoru Matsuishi, Oliver Fenwick, David O. Scanlon, Martijn A. Zwijnenburg, Derya Baran and Bob C. Schroeder
- 390 Study of the electron-doping mechanism in single-walled carbon nanotubes using dimethylbenzimidazole**
N. Tanaka, I. Yamaguchi, R. Yamaguchi and T. Fujigaya
- 400 Organic thermoelectrics: general discussion**

CONCLUDING REMARKS

- 417 Concluding remarks: challenges and prospects in organic photonics and electronics**
Hiroyuki Nishide

ADDITIONAL INFORMATION

- 427 Poster titles**
- 429 List of participants**