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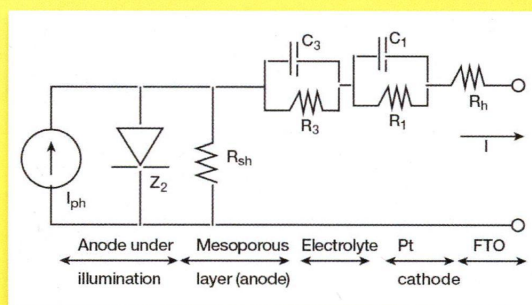
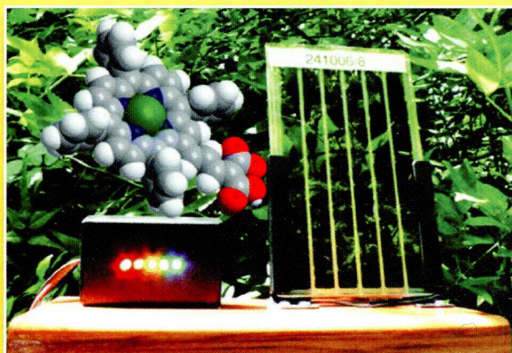
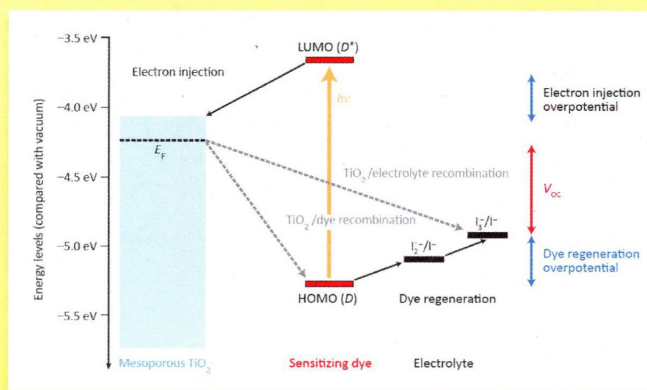
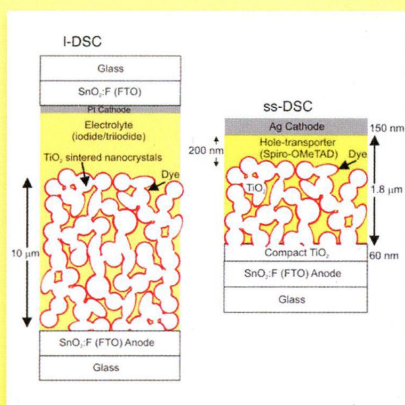
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Structural Features
and Fundamental
Processes of
Dye-Sensitized
Solar Cells Based
on Mesoscopic
Oxide Layers



MICHAEL GRÄTZEL FESTSCHRIFT



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ON THE COVER: Structural features and fundamental processes of dye-sensitized solar cells based on mesoscopic oxide layers. Top left: Schematic representation of the dye-sensitized solar cells using liquid electrolytes (l-DSC) and solid-state hole transport materials (ss-DSC). (From: Snaith, H. J. Perovskites: The Emergence of a New Era for Low-Cost, High-Efficiency Solar Cells. *J. Phys Chem Lett.* **2013**, *4*, 3623–3630.) Top right: Interplay of various electron-transfer processes involved in dye-sensitized solar cells. (Reprinted with permission from Macmillan Publishers, Ltd. (Hardin, B. E.; Snaith, H. J.; McGhee, M. D. The Renaissance of Dye-Sensitized Solar Cells. *Nat. Photon.* **2012**, *6*, 162–169.)) Bottom left: A prototype green translucent dye-sensitized solar cell based on zincporphyrins. Bottom right: Electrical circuit model for the main charge-transport processes of dye-sensitized solar cells. This special issue was organized by Guest Editor Kuppaswamy Kalyanasundaram.

SPECIAL ISSUE: MICHAEL GRÄTZEL FESTSCHRIFT

Guest Editor: Kuppaswamy Kalyanasundaram

Special Issue Preface

16303 dx.doi.org/10.1021/jp5054716
Preface to the Festschrift in Honor of Professor Michael Grätzel, Pioneer of Mesoscopic Solar Cells
K. Kalyanasundaram

16307 dx.doi.org/10.1021/jp504759t
Research Collaborators of Professor Michael Grätzel (1977–2014)

16309 dx.doi.org/10.1021/jp504758k
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16618 [dx.doi.org/10.1021/jp412532z](https://doi.org/10.1021/jp412532z)


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Charge Transport in Photoanodes Constructed with Mesoporous TiO₂ Beads for Dye-Sensitized Solar Cells

Alexander R. Pascoe, Dehong Chen, Fuzhi Huang, Noel W. Duffy, Rachel A. Caruso, and Yi-Bing Cheng*

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16688  [dx.doi.org/10.1021/jp412655p](https://doi.org/10.1021/jp412655p)

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16703 [dx.doi.org/10.1021/jp412674g](https://doi.org/10.1021/jp412674g)

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Stable Quasi-Solid-State Dye-Sensitized Solar Cells Using Novel Low Molecular Mass Organogelators and Room-Temperature Molten Salts

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UV-Imprint Resists Generated from Polymerizable Ionic Liquids and Titania Nanoparticles

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16749  [dx.doi.org/10.1021/jp412731z](https://doi.org/10.1021/jp412731z)

Crown Ether-Substituted Carbazole Dye for Dye-Sensitized Solar Cells: Controlling the Local Ion Concentration at the TiO₂/Dye/Electrolyte Interface


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Impact of Molecular Charge-Transfer States on Photocurrent Generation in Solid State Dye-Sensitized Solar Cells Employing Low-Band-Gap Dyes

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Surface Traps of TiO₂ Nanosheets and Nanoparticles as Illuminated by Spectroelectrochemical Photoluminescence

Riley E. Rex, Fritz J. Knorr, and Jeanne L. McHale*

16842 [dx.doi.org/10.1021/jp500395a](https://doi.org/10.1021/jp500395a)


Improvement of Hematite as Photocatalyst by Doping with Tantalum

Xinsheng Zhang, Huicheng Li, Shijun Wang, Fu-Ren F. Fan, and Allen J. Bard*

16851  [dx.doi.org/10.1021/jp500370z](https://doi.org/10.1021/jp500370z)

Application of Small Molecule Donor Materials Based on Phenothiazine Core Unit in Bulk Heterojunction Solar Cells

Qin Tan, Xichuan Yang,* Ming Cheng, Haoxin Wang, Xiuna Wang, and Licheng Sun*

16856  [dx.doi.org/10.1021/jp500364v](https://doi.org/10.1021/jp500364v)

Porous Tin Oxide Nanosheets with Enhanced Conversion Efficiency as Dye-Sensitized Solar Cell Electrode

Xiaoqian Xu, Fangjian Qiao, Liyun Dang, Qingyi Lu,* and Feng Gao*

16863  [dx.doi.org/10.1021/jp5004006](https://doi.org/10.1021/jp5004006)

Acetonitrile Solution Effect on Ru N749 Dye Adsorption and Excitation at TiO₂ Anatase Interface

Yoshitaka Tateyama,* Masato Sumita, Yusuke Ootani, Koharu Aikawa, Ryota Jono, Liyuan Han, and Keitaro Sodeyama

16872  [dx.doi.org/10.1021/jp500427t](https://doi.org/10.1021/jp500427t)

Photo-Ionic Cells: Two Solutions to Store Solar Energy and Generate Electricity on Demand

Manuel A. Méndez, Pekka Peljo, Micheál D. Scanlon, Heron Vrabel, and Hubert H. Girault*

16884  [dx.doi.org/10.1021/jp5004209](https://doi.org/10.1021/jp5004209)

Higher Open Circuit Voltage and Reduced UV-Induced Reverse Current in ZnO-Based Solar Cells by a Chemically Modified Blocking Layer

Eran Edri, Nir Kedem, Hagai Cohen, Piers Barnes, and Gary Hodes*

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Introducing an Intermediate Band into Dye-Sensitized Solar Cells by W⁶⁺ Doping into TiO₂ Nanocrystalline Photoanodes


Zhengfu Tong, Tao Peng, Weiwei Sun, Wei Liu,* Shishang Guo,* and Xing-Zhong Zhao*

16896 

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Molecular Engineering of 2-Quinolinone Based Anchoring Groups for Dye-Sensitized Solar Cells


Paramaguru Ganesan, Aravindkumar Chandiran, Peng Gao,* Renganathan Rajalingam,* Michael Grätzel, and Mohammad Khaja. Nazeeruddin*

16904 

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Femtosecond Infrared Transient Absorption Dynamics of Benzimidazole-Based Ruthenium Complexes on TiO₂ Films for Dye-Sensitized Solar Cells

Hung-Yu Hsu, Chi-Wen Cheng, Wei-Kai Huang, Yuan-Pern Lee,* and Eric Wei-Guang Diau*

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Using Scanning Electrochemical Microscopy to Examine Copper(I) Sensitizers for Dye-Sensitized Solar Cells

Colin J. Martin,* Biljana Bozic-Weber, Edwin C. Constable,* Thilo Glatzel, Catherine E. Housecroft, and Iain A. Wright

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Photoelectrochemical and Electrochemical Characterization of Sub-Micro-Gram Amounts of Organic Semiconductors Using Scanning Droplet Cell Microscopy


Jan Philipp Kollender, Jacek Gasiorowski, Niyazi S. Sariciftci, Andrei I. Mardare, and Achim Walter Hassel*

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Effect of Sensitizer Structure and TiO₂ Protonation on Charge Generation in Dye-Sensitized Solar Cells

Enrico Ronca, Gabriele Marotta, Mariachiara Pastore,* and Filippo De Angelis*

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Excitation Energy Transfer within Covalent Tetrahedral Perylene-3,4,9,10-tetracarboxylic diimide Tetramers and Their Intermolecular Aggregates

Charusheela Ramanan, Chul Hoon Kim, Tobin J. Marks,* and Michael R. Wasielewski*

16951

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Submicrometer@nano Bimodal TiO₂ Particles as Easily Sintered, Crack-Free, and Current-Contributed Scattering Layers for Dye-Sensitized Solar Cells

Mengyu Gao, Yichuan Rui, Hongzhi Wang,* Yaogang Li, and Qinghong Zhang*

16959 

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A Bismuth Vanadate–Cuprous Oxide Tandem Cell for Overall Solar Water Splitting






Pauline Borno, Fatwa F. Abdi, S. David Tilley, Bernard Dam, Roel van de Krol, Michael Graetzel, and Kevin Sivula*






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Cross-Linkable Molecular Hole-Transporting Semiconductor for Solid-State Dye-Sensitized Solar Cells

Nanjia Zhou, Byunghong Lee, Amod Timalina, Peijun Guo, Xinge Yu, Tobin J. Marks,* Antonio Facchetti,* and R. P. H. Chang*

- 16976  [dx.doi.org/10.1021/jp500493t](https://doi.org/10.1021/jp500493t)
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- 16987  [dx.doi.org/10.1021/jp5004903](https://doi.org/10.1021/jp5004903)
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- 16995 [dx.doi.org/10.1021/jp500449z](https://doi.org/10.1021/jp500449z)
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- 17001 [dx.doi.org/10.1021/jp500471s](https://doi.org/10.1021/jp500471s)
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- 17010 [dx.doi.org/10.1021/jp5004424](https://doi.org/10.1021/jp5004424)
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- 17019  [dx.doi.org/10.1021/jp5005242](https://doi.org/10.1021/jp5005242)
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- 17028 [dx.doi.org/10.1021/jp500542v](https://doi.org/10.1021/jp500542v)
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- 17036  [dx.doi.org/10.1021/jp5005314](https://doi.org/10.1021/jp5005314)
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- 17046  [dx.doi.org/10.1021/jp500589n](https://doi.org/10.1021/jp500589n)
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- 17054  [dx.doi.org/10.1021/jp5006346](https://doi.org/10.1021/jp5006346)
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- 17060  [dx.doi.org/10.1021/jp5008347](https://doi.org/10.1021/jp5008347)
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- 17067  [dx.doi.org/10.1021/jp500869r](https://doi.org/10.1021/jp500869r)
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- 17079  [dx.doi.org/10.1021/jp500879p](https://doi.org/10.1021/jp500879p)
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- 17100 [dx.doi.org/10.1021/jp501254k](https://doi.org/10.1021/jp501254k)
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- 17108  [dx.doi.org/10.1021/jp501481c](https://doi.org/10.1021/jp501481c)
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- 17116 [dx.doi.org/10.1021/jp5015274](https://doi.org/10.1021/jp5015274)
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- 17123 [dx.doi.org/10.1021/jp5016092](https://doi.org/10.1021/jp5016092)
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Jan Poppe, Stephen G. Hickey,* and Alexander Eychmüller

17142  [dx.doi.org/10.1021/jp501768n](https://doi.org/10.1021/jp501768n)
Nucleation and Growth Mechanisms of an Electrodeposited Manganese Oxide Oxygen Evolution Catalyst
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17153  [dx.doi.org/10.1021/jp502341a](https://doi.org/10.1021/jp502341a)
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17160  [dx.doi.org/10.1021/jp5023407](https://doi.org/10.1021/jp5023407)
Hybrid Lead Halide Iodide and Lead Halide Bromide in Efficient Hole Conductor Free Perovskite Solar Cell
Sigalit Aharon, Bat El Cohen, and Lioz Etgar*

17166  [dx.doi.org/10.1021/jp502447y](https://doi.org/10.1021/jp502447y)
Molecular Engineering of Phthalocyanine Sensitizers for Dye-Sensitized Solar Cells
Mine Ince, Jun-Ho Yum, Yongjoo Kim, Simon Mathew, Michael Grätzel, Tomás Torres,* and Mohammad K. Nazeeruddin*

17171  [dx.doi.org/10.1021/jp500717w](https://doi.org/10.1021/jp500717w)
Influence of Thermal Processing Protocol upon the Crystallization and Photovoltaic Performance of Organic–Inorganic Lead Trihalide Perovskites
Michael Saliba, Kwan Wee Tan, Hiroaki Sai, David T. Moore, Trent Scott, Wei Zhang, Lara A. Estroff, Ulrich Wiesner,* and Henry J. Snaith*