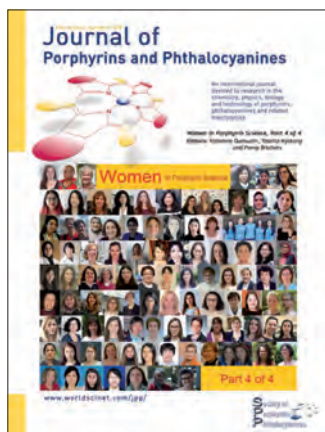


CONTENTS

About the Cover



Editors: Fabienne Dumoulin, Tebello Nyokong and Penny Brothers

This fourth and last cover of the Women in Porphyrin Science reflects, once again, the diversity of all the contributors and editors. This issue includes 12 reviews and 31 research articles from all over the world.

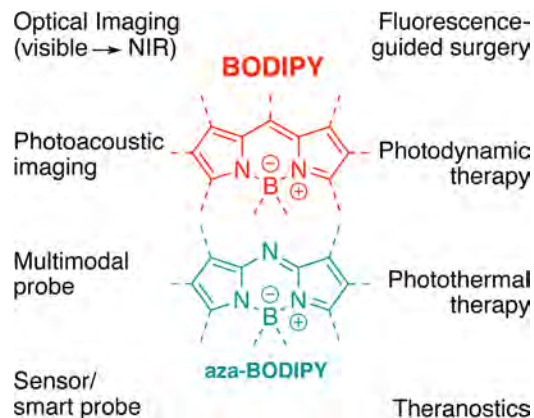
Reviews

pp. 1159–1183

BODIPYS and aza-BODIPY derivatives as promising fluorophores for *in vivo* molecular imaging and theranostic applications

Ewen Bodio, Franck Denat and Christine Goze*

Since their discovery in 1968, the BODIPYs dyes (4,4-difluoro-4-bora-3a, 4a diaza-s-indacene) found an exponentially increasing number of applications, in a large variety of scientific areas, in particular in molecular imaging. This review aims at presenting representative examples of recent *in vivo* optical molecular imaging applications of BODIPYs and aza-BODIPYs, therefore highlighting the potential of these dyes in this field.



pp. 1184–1194

Increasing the complexity of oxoporphyrinogen colorimetric sensing chromophores: N-alkylation and β -substitution

Mandeep K. Chahal, Nadiia Velychkivska, Whitney A. Webre, Jan Labuta, Shinsuke Ishihara, Katsuhiko Ariga, Francis D'Souza and Jonathan P. Hill*

Meso-5,10,15,20-tetrakis-3,5-di-*tert*-butyl-4-oxocyclohexadienyldene-porphyrinogen, **OxP**, is a versatile, highly colored chromophore derived from *meso*-5,10,15,20-tetrakis(3,5-di-*tert*-butyl-4-hydroxyphenyl)porphyrin. The chromogenic responses of **OxP** (solvatochromism, ionochromism, halochromism) can be modulated by varying its chemical structure and this is reviewed here based on the introduction of substituents at central nitrogen atoms or pyrrolic β -positions.

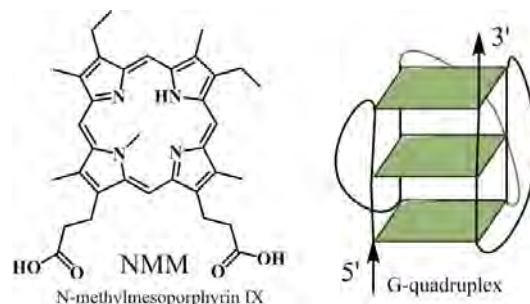


pp. 1195–1215

N-methyl mesoporphyrin IX as a highly selective light-up probe for G-quadruplex DNA

Ariana Yett, Linda Yingqi Lin, Dana Beseiso, Joanne Miao and Liliya A. Yatsunyk*

N-methyl mesoporphyrin IX (NMM) is a water-soluble, non-symmetric porphyrin with excellent optical properties and unparalleled selectivity for G-quadruplex DNA. The latter makes NMM a valuable scaffold for the design of novel anticancer therapies. In this review we survey the literature describing the GQ-binding properties of NMM as well as its wide utility in chemistry and biology.

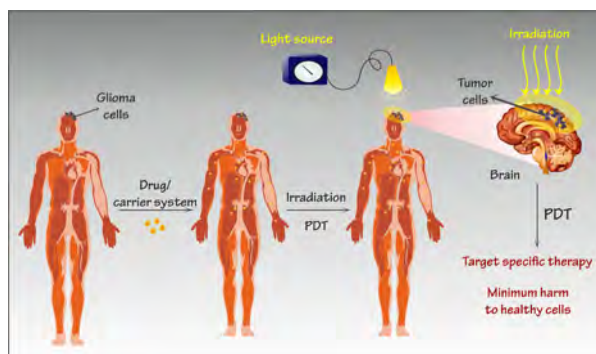


pp. 1216–1228

Application of photodynamic therapy drugs for management of glioma

Sunil K. Dubey*, Sai K. Pradyuth, Ranendra N. Saha, Gautam Singhvi, Amit Alexander, Mukta Agrawal, Bruce A. Shapiro and Anu Puri*

Intravenous administration of free photodynamic therapy (PDT) drug or drug formulated in a nanocarrier results in drug accumulation in brain tumors as well as in other organs. The activation of accumulated PDT drugs by an appropriate source of light at the tumor site reduces the undesirable effects and enhances the potency of the therapy. The photodynamic therapy improves the site specificity and efficacy of glioma treatments by localized activation of the administered PDT molecules to the tumor tissue.

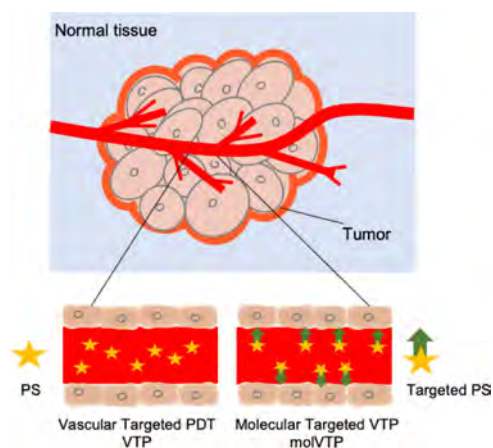


pp. 1229–1240

Vascular targeted photodynamic therapy: A review of the efforts towards molecular targeting of tumor vasculature

Vida Mashayekhi, Charlotte Op 't Hoog and Sabrina Oliveira*

Over the years, efforts have been made to improve the efficacy of photodynamic therapy and reduce undesired side effects. One of the strategies is targeting the photosensitizer to molecules which are solely expressed or are more abundant on tumor vasculature. For this, different targeting moieties have been explored and their efficacy assessed in several preclinical studies. Results here discussed are encouraging for the application of molecular targeted VTP (molVTP) to improve selectivity and efficacy of cancer treatment.

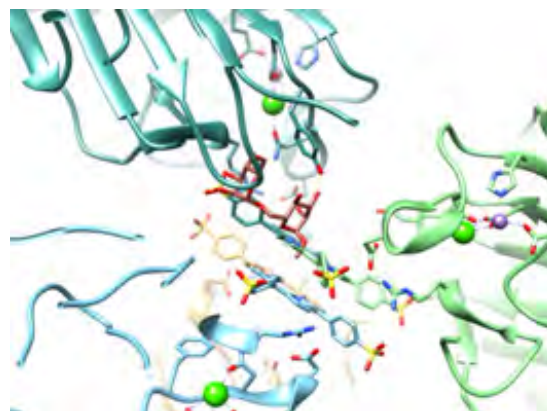


pp. 1241–1250

Dual function of lectins — new perspectives in targeted photodynamic therapy

Vanya Bogoeva*, Lidiya Petrova, Julie Bouckaert, Anna Yordanova, Ivan Ivanov, Régis Vanderesse and Céline Frochot

This review focuses on the dual function of plant lectins. They are especially suitable for targeted photodynamic therapy (PDT), as they preferentially recognize specific antigens on the glycosylated cancer cells and besides this can interact with photosensitizers (PS). This reveals new perspectives in targeted PDT — to deliver selectively PS to tumor cells.



pp. 1251–1264

40 years with porphyrazines

Ol'ga G. Khelevina* and Alena S. Malyasova*

Our laboratory started research of tetraazaporphyrins in the middle of the 1970s. Before our works there was no information in the literature about coordination and ionization properties of these compounds, formation of their metal complexes, or about their state and behavior in proton-donating and proton-accepting media. We carried out the first studies of the coordination and acid–base properties of unsubstituted tetraazaporphine and its octaphenyl and tetra(tetramethylene) substituted derivatives. In this microreview we summarize our works on the peripheral functionalization of unsubstituted porphyrazines and on their acid–base and coordination properties.

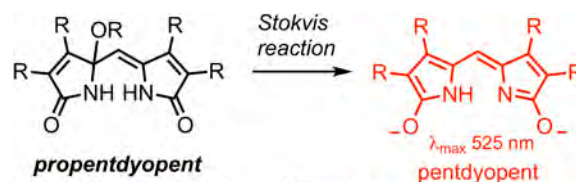


pp. 1265–1272

Propentdyopents: Brief history of a family of dipyrrolic pigments

Elisa Tomat*

Propentdyopent compounds are naturally occurring heme metabolites that present a characteristic dipyrin-1,9-dione framework and were first described in the 19th century as urinary pigments. This mini-review summarizes the relevance of propentdyopents to heme biochemistry and human physiology, along with the synthetic methods to prepare their analogs and metal complexes. The ability of propentdyopents to act as redox-active ligands is emerging as a new characteristic of this old class of dipyrrolic pigments.

**propentdyopent**

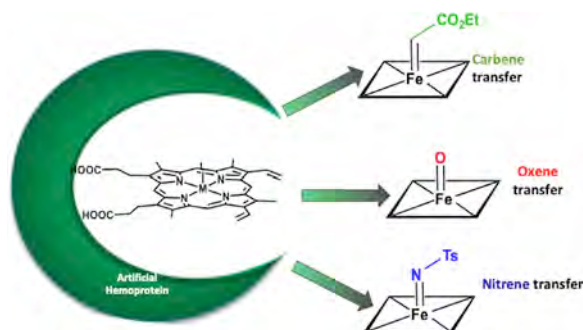
- heme metabolites and biomarkers
- redox-active ligands in metal complexes and fluorophores

pp. 1273–1285

Recent advances in the field of artificial hemoproteins: New efficient eco-compatible biocatalysts for nitrene-, oxene- and carbene-transfer reactions

Kalani Kariyawasam, Rémy Ricoux and Jean-Pierre Mahy*

In the last few years, artificial hemoproteins have been prepared through two main strategies. First, the incorporation of synthetic metalloporphyrins into the chiral cavity of a protein led to artificial hemoproteins that catalyzed oxene transfer and cyclopropanation reactions with good activities but moderate enantioselectivities. Second, the directed evolution of natural hemoproteins such as myoglobin and cytochromes P450, led to artificial hemoproteins that catalyzed not only oxene transfer reactions with improved activities but also carbene and nitrene transfer reactions with high efficiencies.

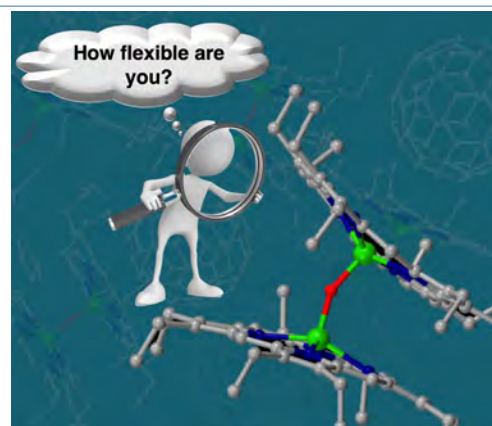


pp. 1286–1307

(Hydr)oxo-bridged heme complexes: From structure to reactivity

Maria C. Carrasco and Shabnam Hematian*

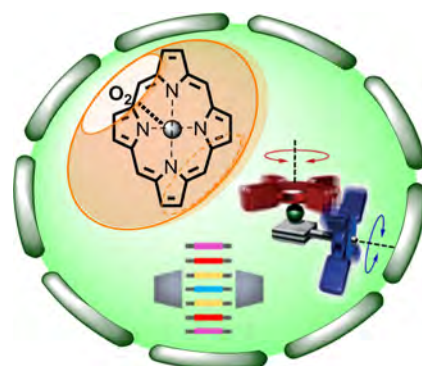
The (hydr)oxo-bridged heme species have been widely studied for the important roles that they play in many life processes or their application for catalysis and preparation of new functional materials. This review encompasses important synthetic, structural and reactivity aspects of such constructs that govern their function and application. Here, we summarize the structural features of all known (hydr)oxo-bridged heme constructs and use those to categorize and thus provide a more comprehensive picture of structure–function relationships.



pp. 1308–1325**Heterocomponent ternary supramolecular complexes of porphyrins: A review**

Elena Prigorchenko, Lukaš Ustrnul, Victor Borovkov and Riina Aav*

This review summarizes ternary complexes of porphyrins leading to sophisticated molecular ensembles including sandwich-type complexes, cages, capsules, tweezers, rotaxanes, and supramolecular architectures mediating oxygen-binding and oxidation reactions. These diverse structures have high potential for application in production of new smart materials and artificial enzymes.

**pp. 1326–1335****25 years of development of Mn porphyrins — from mimics of superoxide dismutase enzymes to thiol signaling to clinical trials: The story of our life in the USA**

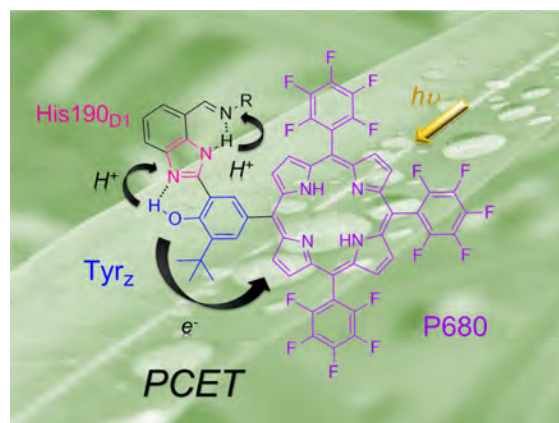
Ines Batinic-Haberle* and Ivan Spasojevic

We (pictured here with our grandson Luka) initially developed redox-active Mn(III) cationic *ortho* *N*-alkyl- or alkoxyalkylpyridylporphyrins as SOD mimics (general structure shown). Yet, they react with numerous biological targets and are consequently involved in cell signaling. Two analogs, MnTE-2-PyP⁵⁺ (alkyl=ethyl) and MnTnBuOE-2-PyP⁵⁺ (alkoxyalkyl=butoxyethyl) are now in several Phase II clinical trials. We hope that our story will inspire researchers to persevere — women in particular.

**Articles****pp. 1336–1345****Design and synthesis of benzimidazole phenol-porphyrin dyads for the study of bioinspired photoinduced proton-coupled electron transfer**

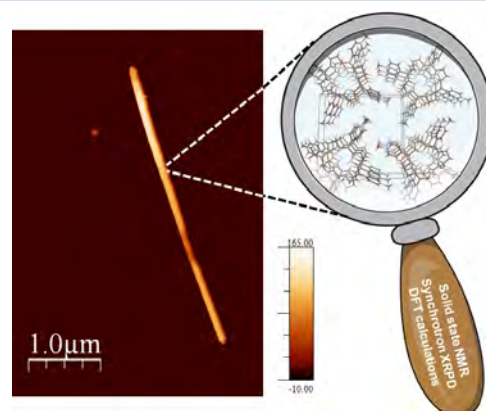
S. Jimena Mora*, Daniel A. Heredia, Emmanuel Odella, Uma Vrudhula, Devens Gust, Thomas A. Moore and Ana L. Moore*

Benzimidazole phenol-porphyrin dyads have been synthesized to study photochemically induced proton-coupled electron transfer (PCET) reactions. High-potential porphyrins have been chosen to model P680, the photoactive chlorophyll cluster of photosystem II (PSII). The benzimidazole phenol (BIP) moiety models the Tyr_z-His190 pair of PSII, the redox mediator that shuttles electrons from the water oxidation catalyst to P680⁺.

**pp. 1346–1354****Synthesis, characterization and modeling of self-assembled porphyrin nanorods**

Danielle Laurencin, Pascal G. Yot, Christel Gervais, Yannick Guari, Sébastien Clément, Erik Elkaim, Matthieu Paillet, Didier Cot and Sébastien Richeter*

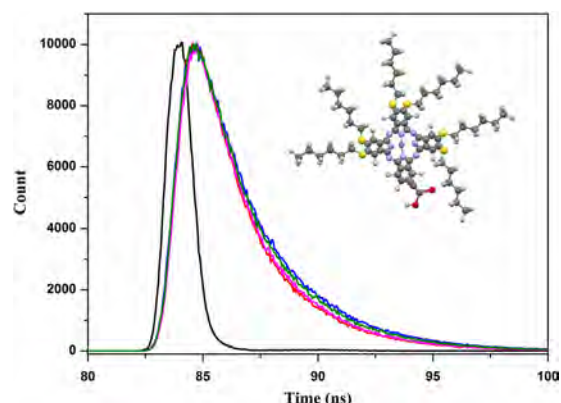
Porphyrin nanorods prepared by the “ion-association” method were characterized at the molecular level by combining different techniques including multinuclear solid state NMR spectroscopy, synchrotron X-ray powder diffraction and DFT calculations.



pp. 1355–1364**Peripherally carboxylic acid substituted asymmetric zinc(II) phthalocyanines: Synthesis and photophysical-chemical properties**

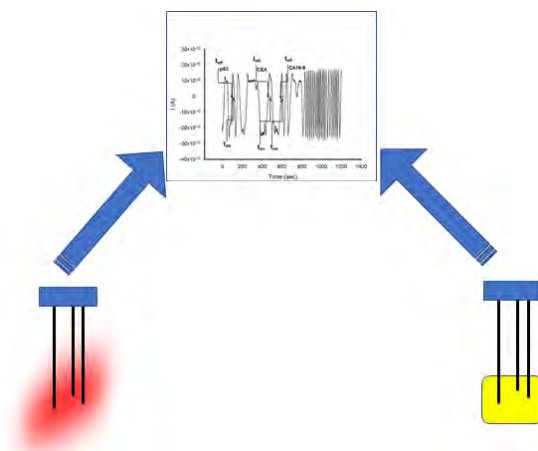
Gülenay Tunç, Mohamad Albakour, Vefa Ahsen and Ayşe Gül Gürek*

Four asymmetric Zn(II) phthalocyanines bearing a carboxylic acid group in the peripheral position have been designed and synthesized to investigate the influence of the COOH group distance on the phthalocyanine core on their photophysical and photochemical properties.

**pp. 1365–1370****Graphene-based stochastic sensors for pattern recognition of gastric cancer biomarkers in biological fluids**

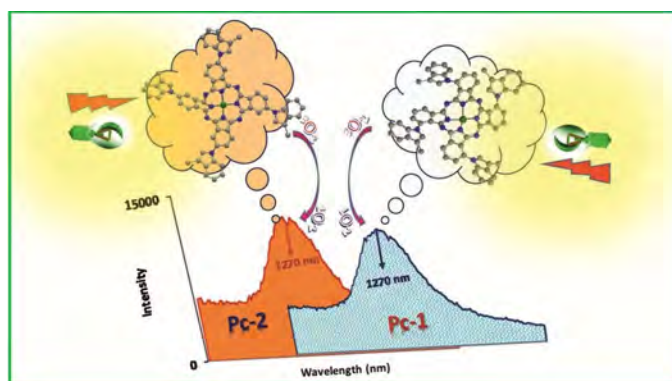
Raluca-Ioana Stefan-van Staden*, Ruxandra-Maria Ilie-Mihai, Florina Pogacean and Stela Pruneanu

The paper proposes pattern recognition of gastric cancer biomarkers: CEA, CA19-9 and p53 in whole blood and urine samples using a stochastic sensor based on exfoliated graphene (E-NGr) paste modified with protoporphyrin IX. The proposed sensor covers large ranges of concentrations favoring the determination of the three biomarkers from the earliest to latest stages of gastric cancer. Validation of the pattern recognition of gastric cancer biomarkers was done using biological samples of whole blood and urine.

**pp. 1371–1379****3-Methylindole-substituted zinc phthalocyanines for photodynamic cancer therapy**

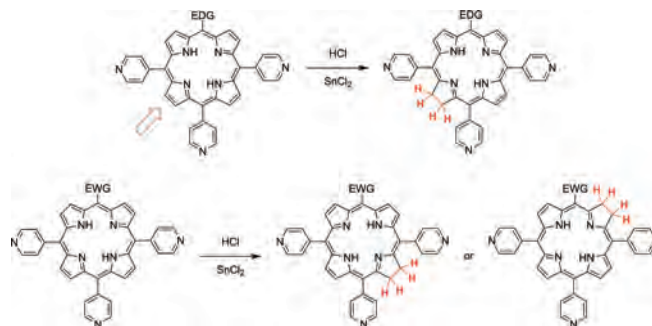
Sami Ayari, Mehmet F. Saglam, Elif Şenkuytu, Pelin B. Erçin, Yunus Zorlu, Ibrahim F. Sengul, Bassem Jamoussi and Devrim Atilla*

Novel peripherally and non-peripherally 3-methylindole-substituted zinc phthalocyanine derivatives were synthesized as photosensitizers for photodynamic therapy (PDT) in cancer treatment. The photophysical, photo-chemical and photobiological properties of these phthalocyanine complexes were also investigated in this study.

**pp. 1380–1397****Regioselective reduction of 5-aryl-10,15,20-tris-(pyridyl) porphyrin to 5-aryl-10,15,20-tris(pyridyl) dihydroporphyrin (chlorin)**

Frédérique Brégier*, Jérémy Godard, Jordan Thiais, Soukaina Bouramtane, Alexia Moulin, Yves Champavier, Alexis Mailleau, Vincent Chaleix and Vincent Sol

Reduction of porphyrins bearing two, three or four pyridyl substituents with tin(II) chloride has been developed for the synthesis of dihydroporphyrins.

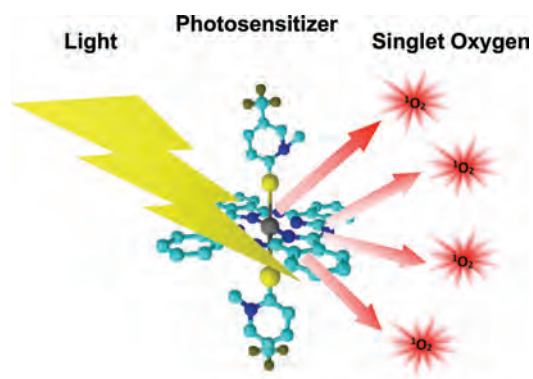


pp. 1398–1405

Synthesis of new water soluble silicon phthalocyanine substituted by linker sulfur atom and photophysical studies for photodynamic therapy

Göknur Yaşa Atmaca* and Ali Erdoğan*

In this work, 5-(trifluoromethyl)-2-thiopyridine-substituted SiPc (1) and its quaternized derivative (2) were synthesized and the effect of the linker sulfur atom on silicon phthalocyanines has been investigated for the first time. In order to determine the therapeutic effect for cancer treatment, photophysical properties were investigated in DMSO, DMF, toluene and water (for complex 2).



pp. 1406–1413

Glycosylated porphyrin-cucurbituril conjugate for photodynamic inactivation of bacteria and doxorubicin carriage for anticancer drug delivery

Melis Özkan, Yağmur Keser, Ahmet Koc and Dönüş Tuncel*

A multifunctional porphyrin-based molecular platform constructed by conjugating a host molecule, cucurbit[7]uril to a triglycosylated tetraphenyl porphyrin was employed as a very efficient photosensitizer in the inactivation of both gram-negative (*E. coli*) and gram-positive bacteria (*B. subtilis*) and growth inhibition of cancer cells as well as a doxorubicin (DOX) carrier for chemophotodynamic dual cancer therapy.

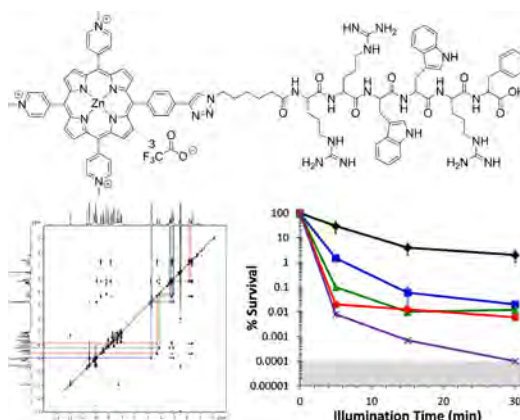


pp. 1414–1439

Towards microbe-targeted photosensitizers: Synthesis, characterization and *in vitro* photodynamic inactivation of the tuberculosis model pathogen *M. smegmatis* by porphyrin-peptide conjugates

Elke Feese, Hanna S. Gracz, Paul D. Boyle and Reza A. Ghiladi*

The re-emergence of tuberculosis as a public health threat has generated strong interest at a fundamental level for elucidating new anti-tubercular treatment options. Here we present the design, synthesis, and characterization of porphyrin-peptide conjugates (PPCs) as photosensitizers for the photodynamic inactivation of *M. smegmatis* as a model for *M. tuberculosis*. Antibacterial studies demonstrated that the PPCs were able to achieve the *in vitro* photodynamic inactivation of *M. smegmatis* by upwards of 5–6 log units at nanomolar concentrations using visible light illumination. Together with photostability and hemolysis studies, the results here show the potential of PPCs as effective photosensitizers against mycobacteria.

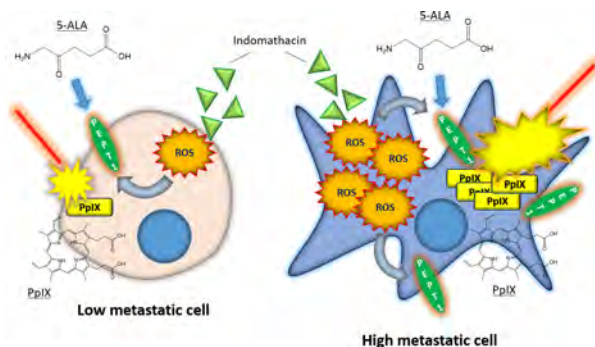


pp. 1440–1447

Enhancement of PDT-cytotoxicity via ROS induced by indomethacin in metastatic breast cancer

Azusa Terasaki, Hiromi Kurokawa, Hiroko P. Indo, Hiroko Bando, Hisato Hara, Hideyuki J. Majima, Hirofumi Matsui and Hiromu Ito*

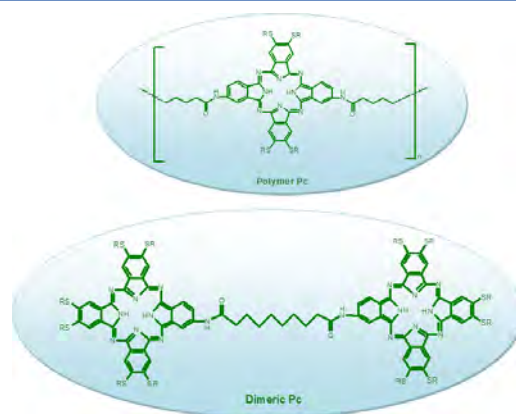
We used two different breast cancer cell lines with different metastaticities and investigated the response of these cell lines to ROS generation by indomethacin treatment and the incorporation of 5-ALA, accumulation of PpIX, and PDT effect by laser irradiation.



pp. 1448–1454**A3B and ABAB aminophthalocyanines: Building blocks for dimeric and polymeric constructs**

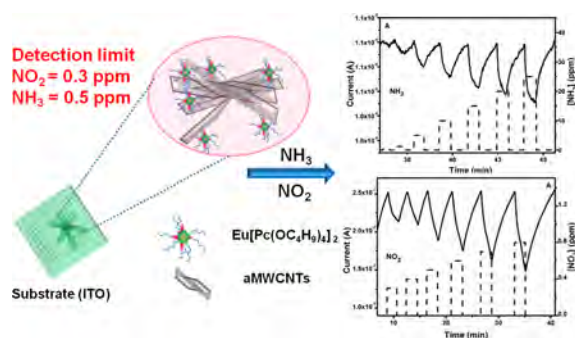
Safiye Bozkurt Ekren, Fabienne Dumoulin, Emel Musluoğlu, Vefa Ahsen* and Ömer Güngör*

Di-amino ABAB and mono-amino A3B phthalocyanines have reacted with mono and di acyl chloride to produce dimeric and polymeric constructs, showing a new route to obtain materials made of phthalocyanines.

**pp. 1455–1462****Excellent ambipolar gas sensing response of Eu[Pc(OC₄H₉)₈]₂/acidified multiwalled carbon nanotubes hybrid at room temperature**

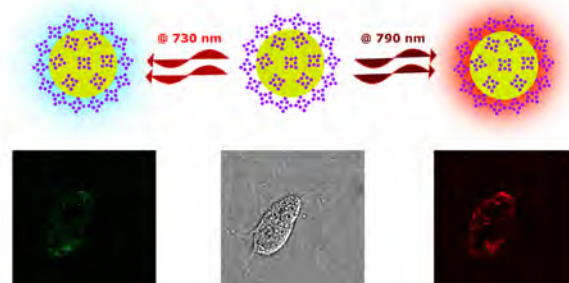
Kiran Abdullah, Xia Kong*, Muhammad Imran, Ghulam Mustafa and Yanli Chen*

An enhanced ambipolar gas sensing device was fabricated based on a Eu[Pc(OC₄H₉)₈]₂/aMWCNTs hybrid material by a simple solvent-processing quasi-Langmuir–Shäfer (QLS) progress with a low detection limit for both electron-accepting gas NO₂ (0.3 ppm) and electron-donating gas NH₃ (0.5 ppm).

**pp. 1463–1469****Soft fluorescent organic nanodots as nanocarriers for porphyrins**

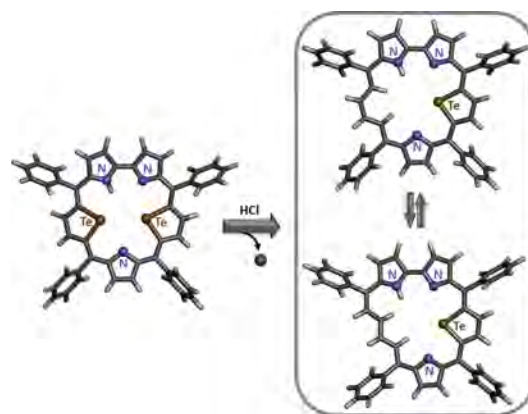
Isabelle Sasaki, Jonathan Daniel, Sébastien Marais, Jean-Baptiste Verlhac, Michel Vaultier and Mireille Blanchard-Desce*

The synthesis of new highly water-soluble fluorescent organic nanoparticles functionalized with hydrophobic tetraphenylporphyrin (TPP) was achieved. The conjugated nanoparticles show two distinct fluorescences which arise from the nanocarrier (blue fluorescence) and from the linked porphyrin (red fluorescence), depending on the excitation wavelengths. Thanks to this property, we could observe the uptake of the conjugated nanoparticles into neuroblastoma cancer cells by two-photon microscopy.

**pp. 1470–1477****A flexible expanded heterocorrole: Tellura[22]porphyrin(6.1.1.0)**

Sandra Hojniak-Thyssen, Michał Szczepaniak, Lechosław Latos-Grażyński and Ewa Pacholska-Dudziak*

An expanded heterocorrole, *meso*-tetraaryl-tellura[22]porphyrin(6.1.1.0), containing a bipyrrrole unit and a six-carbon long link, has been synthesized by a controlled tellurium-atom extrusion from *meso*-tetraaryl-26,28-ditellurasapphyrin. The new aromatic porphyrin-annulene hybrid is conformationally flexible in solution, on account of the C₄ unit adopting two different configurations: *trans-cis-trans* or *all-trans*.

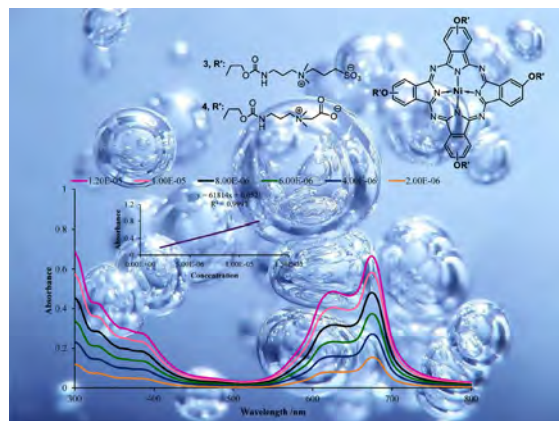


pp. 1478–1485

Peripherally substituted soluble nickel phthalocyanines: Synthesis, characterization, aggregation behavior and antioxidant properties

Senem Çolak Yazıcı*, Sibel Kahraman, Salih Z. Yıldız and Mahmut D. Yılmaz

In this study, the novel water soluble derivatives of 2-(*N*-((3-dimethylamino)-propyl) carbamate)oxyethyl-substituted nickel (II) phthalocyanine (**2**) bearing different types of groups such as sulfobetaine (**3**) and betaine (**4**) were synthesized for the first time. Ionic phthalocyanines (**3** and **4**) showed excellent solubility in aqueous media and their critical micelle concentrations and antioxidant properties were investigated.



pp. 1486–1494

Photodynamic activity of Sn(IV) meso-tetraacenaphthylporphyrin and its methyl-β-cyclodextrin inclusion complexes on MCF-7 breast cancer cells

Nthabeleng Molupe, Balaji Babu, Earl Prinsloo, Abdessamad Y. A. Kaassis, Katharina Edkins, John Mack* and Tebello Nyokong

A novel Sn(IV) meso-tetraacenaphthylporphyrin (SnTAcP) has been synthesized and characterized. SnTAcP was complexed with methyl-β-CD (mβ-CD), a nanocarrier that enhances water solubility, and the complexes were evaluated as PDT agents using MCF-7 breast cancer cells.

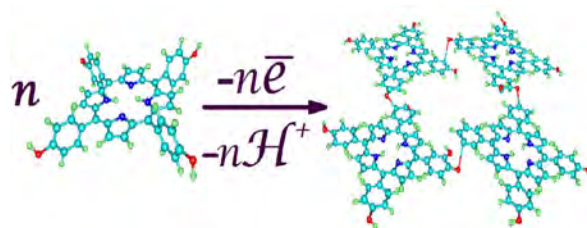


pp. 1495–1504

An electrochemical quartz crystal microbalance study of 5,10,15,20-tetrakis(4-hydroxyphenyl)porphyrin electropolymerization process

Mariya V. Tesakova*, Sergey M. Kuzmin and Vladimir I. Parfenyuk

Poly-5,10,15,20-tetrakis(4-hydroxyphenyl)porphyrin films have been obtained in the positive potential region by electrooxidation. The effect of the electrolysis conditions on the electropolymerization and properties of polyporphyrin films has been studied by the electrochemical quartz crystal microbalance method. The obtained films possess conductivity of the *p*-type.

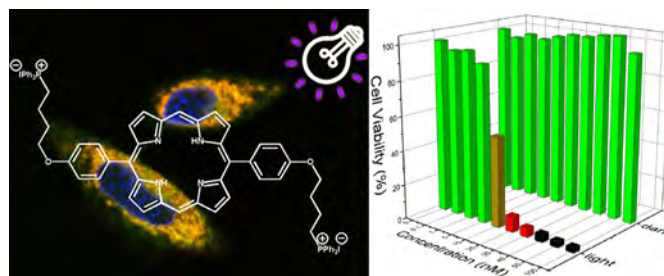


pp. 1505–1514

Mitochondria-targeted porphyrin-based photosensitizers containing triphenylphosphonium cations showing efficient *in vitro* photodynamic therapy effects

Xing Guo, Hao Wu, Wei Miao, Yangchun Wu, Erhong Hao* and Lijuan Jiao*

Three porphyrin-derived photosensitizers containing various triphenylphosphonium targeting groups, were developed. They exhibited excellent $^1\text{O}_2$ quantum yields in acetonitrile and specifically stained the mitochondria of HeLa cells. Photosensitizer **mito-dp**, containing two triphenylphosphonium cations, was found to be the most uptaken by cells and exhibited the best PDT effect with an effective phototoxicity ($\text{IC}_{50}(\text{light}) = 12.4 \text{ nM}$), suggestive of a potential application as a mitochondria-targeted PDT agent.

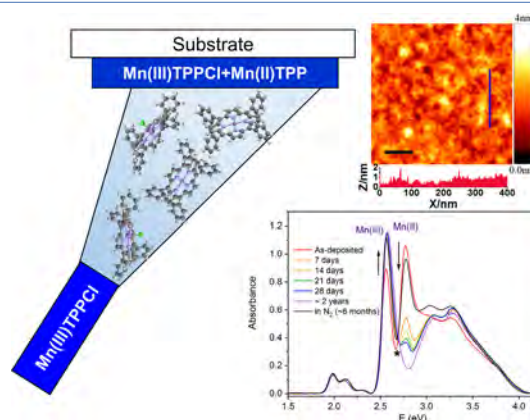


pp. 1515–1522

Properties and degradation of manganese(III) porphyrin thin films formed by high vacuum sublimation

Hsiang-Han Tseng, Michele Serri, Nicholas Harrison and Sandrine Heutz*

Smooth and homogeneous thin films of manganese (III) tetraphenylporphyrin chloride (MnTPPCL) were prepared by high-vacuum organic molecular beam deposition. The sublimation process leads to the loss of the chlorine ligand and reduction of the metal to Mn(II) for about half of the molecules. The diffusion coefficient of oxygen into the film can be derived by examining the oxidation back to Mn(III).

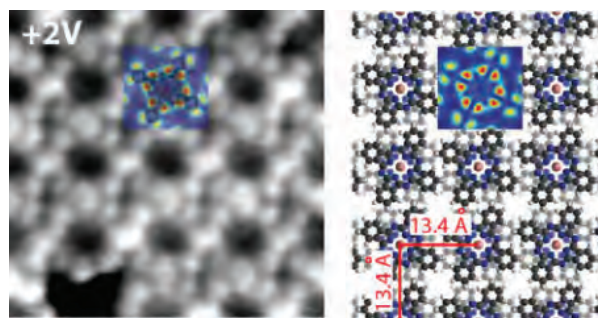


pp. 1523–1534

Grafting, self-organization and reactivity of double-decker rare-earth phthalocyanine

Nadine Witkowski*, Johann Lüder, Ieva Bidermane, Mattia Farronato, Geoffroy Prévot, Marcel Bouvet, Carla Puglia and Barbara Brena

Unveiling the interplay of semiconducting organic molecules with their environment such as inorganic materials or atmospheric gas is the first step to design hybrid devices with tailored optical, electronic or magnetic properties. The present article focuses on the grafting, self-organization and reactivity of double-decker lutetium phthalocyanine and reveals an unexpected resilience behavior of the molecule toward environments by means of experimental investigation supplemented with advanced numerical simulations.

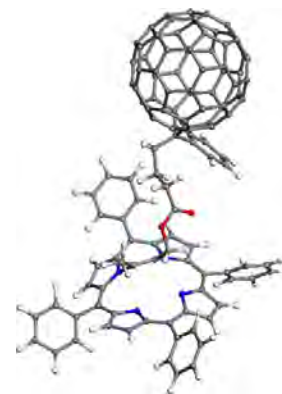


pp. 1535–1541

Monocationic porphyrin dyads with fullerene as the electron-accepting material

Yuko Takao*, Kazuyuki Moriwaki, Takumi Mizuno and Toshinobu Ohno

Dyad compounds where a fullerene was covalently linked to a monocationic porphyrin at N,N' -bridge substituent were synthesized by condensation reaction. The energy levels of the frontier orbitals were sufficiently low to be comparable to acceptor materials and varied depending on the peripheral substituents of the porphyrin unit. The P3HT/dyad blended film containing the OEP dyad had more amorphous fractions than that containing the TPP dyad.

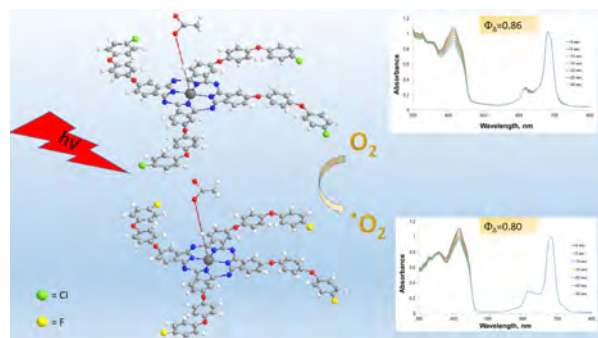


pp. 1542–1550

New peripherally-substituted lutetium mono and bis phthalocyanines: Synthesis and comparative photophysical and photochemical properties

Nagihan Kocaağa, Öznur Dülger Kutlu* and Ali Erdoğan*

In this study, new peripherally substituted lutetium mono and bis phthalocyanines were synthesized and the substituent effect on the photophysical parameters of Pcs was investigated. A comparison between photophysical and photochemical parameters of mono and bis derivatives showed that mono phthalocyanines are better photosensitizers than bis phthalocyanines. Photophysical and photochemical properties of phthalocyanines are very useful for photodynamic therapy applications.

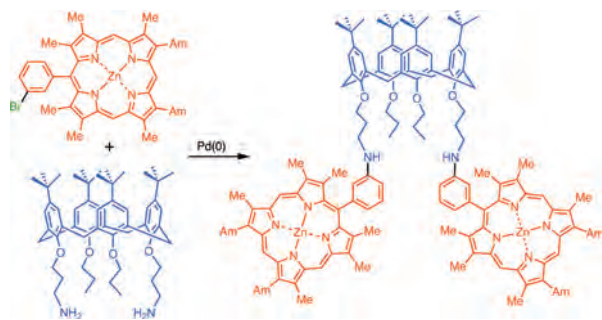


pp. 1551–1562

Synthesis of the porphyrin-calix[4]arene conjugates via Pd-catalyzed amination and their evaluation as fluorescent chemosensors

Alexei A. Yakushev, Alexei D. Averin, Maria V. Sakovich, Ivan M. Vatsouro, Vladimir V. Kovalev, Sergei A. Syrbu, Oskar I. Koifman and Irina P. Beletskaya*

The synthesis of porphyrin-calix[4]arene conjugates was carried out using the Pd(0)-catalyzed amination of Zn(II) *meso*-(3-bromophenyl)porphyrinate with bis(3-aminopropoxy)substituted calix[4]arenes (in cone and 1,3-alternate conformations). The investigation of the fluorescence of the conjugates was studied in the presence of 18 metal perchlorates.

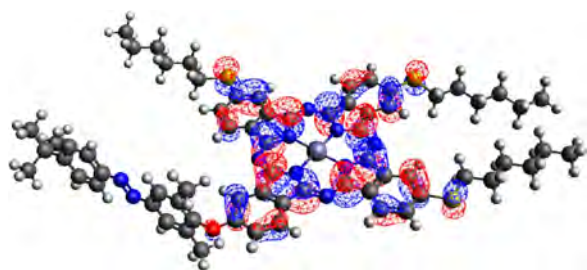


pp. 1563–1569

Unsymmetrical phthalocyanines containing azo moiety: Synthesis and photophysical properties

Ebru Özkan Garip, Mukaddes Özçeşmeci, Ramazan Katırcı, İbrahim Özçeşmeci and Esin Hamuryudan*

Unsymmetrical metal-free phthalocyanine was synthesized through cyclotetramerization of 4-[2,6-dimethyl-4-(4-*tert*-butyl-phenylazo)phenoxy]phthalonitrile and 4-(hexylthio)phthalonitrile in the presence of lithium in *n*-pentanol, then metal-free phthalocyanine was obtained by acidification with acetic acid. Finally, metalation was achieved by refluxing metal-free phthalocyanine in *n*-pentanol in the presence of zinc (II) salt. The structure of synthesized phthalocyanine derivatives were characterized by using proton nuclear magnetic resonance, mass spectrometry, ultraviolet-visible spectroscopy, and Fourier transform infrared spectroscopy. The HOMO–LUMO energies were computed using density functional theory. The HOMO–LUMO energy difference is 2.28 eV. The calculated results have been found to be consistent with the experimental data. In addition, aggregation behaviors and general trends for photophysical properties of these phthalocyanine derivatives were studied in tetrahydrofuran. The emission intensities of these phthalocyanine derivatives were strongly quenched by 1,4-benzoquinone in tetrahydrofuran.

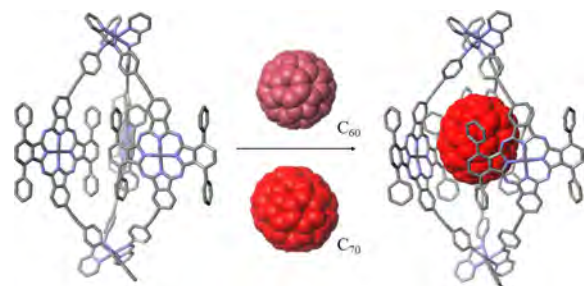


pp. 1570–1575

Selective guest recognition by a metallo-organic phthalocyanine-based host

Ettore Fazio, M. Jesús Vicente-Arana, M.Teresa Alonso, Tomás Torres* and Gema de la Torre*

A phthalocyanine (Pc)-based metallo-organic helicate (Fe_2Pc_3) has proved its ability to selectively encapsulate C_{70} from a mixture of C_{60} and C_{70} . In addition, a bisimidazole-containing naphthalenediimide was able to induce guest release over preformed fullerene complexes, the whole process proving a method for the selective capture and release of fullerene derivatives from complex mixtures.

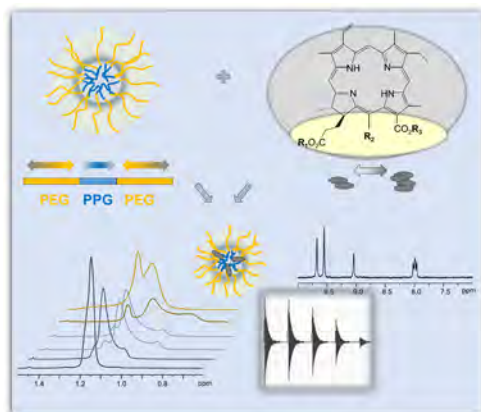


pp. 1576–1586

Monitoring the encapsulation of chlorin e6 derivatives into polymer carriers by NMR spectroscopy

Sara Pfister, Luca Sauser, Ilche Gjuroski, Julien Furrer and Martina Vermathen*

Encapsulation of five chlorin e6 derivatives (xCe) into a series of five PEG-PPG-PEG copolymer micelles (BCMs) was monitored by ^1H NMR spectroscopy. xCes of low and intermediate hydrophobicity were well encapsulated but hydrophobic ones were not. The number of PPG units and the micellar dynamic properties play crucial roles for efficient loading. Exchange between bulk and BCM core was monitored by DOSY NMR and is enhanced for hydrophilic xCe.

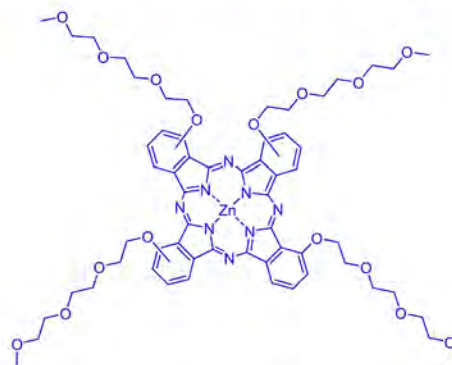


pp. 1587–1591**Effect of PVP formulation on the *in vitro* photodynamic efficiency of a photosensitizing phthalocyanine**

Eda Gazel Pehlivan, Yıldız Ek, Derya Topkaya, Uygur Halis Tazebay* and Fabienne Dumoulin*

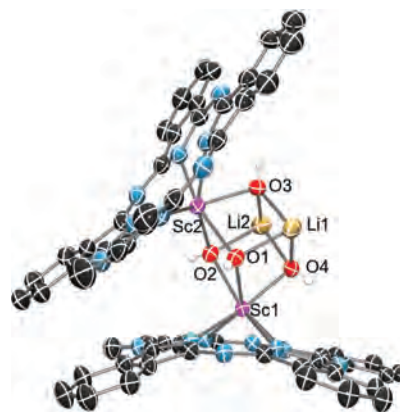
Formulation of photosensitisers, and especially phthalocyanines, is crucial to overcome poor solubility issues. Polyvinylpyrrolidone (PVP), an FDA-approved food additive, is emerging as an extremely promising formulation. Its effect on the photodynamic efficiency of a photosensitizing phthalocyanine was tested and compared to direct administration from water and the more classical formulation with DMSO. PVP formulation proved to work very well, with submicromolar IC_{50} and IC_{90} values against MDA-MB-231 human cancer cells, confirming its interest and relevance in photodynamic therapy.

Formulation..... DMSO? Water?PVP !!!

**pp. 1592–1602****Synthesis, structures and reduction chemistry of monophthalocyanine scandium hydroxides**

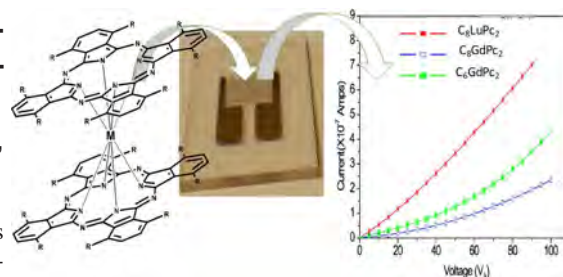
Yumeela Ganga-Sah, Elahe Tajbakhsh, Rachel H. Platel, Wen Zhou and Daniel B. Leznoff*

Phthalocyanine scandium(III) hydroxide complexes were prepared and structurally characterized from $PcScCl$ and show a range of structures in the solid state, depending on solvent of crystallization and accompanying alkali metal cation.

**pp. 1603–1615****Steady state charge conduction through solution-processed liquid crystalline lanthanide bisphthalocyanine films**

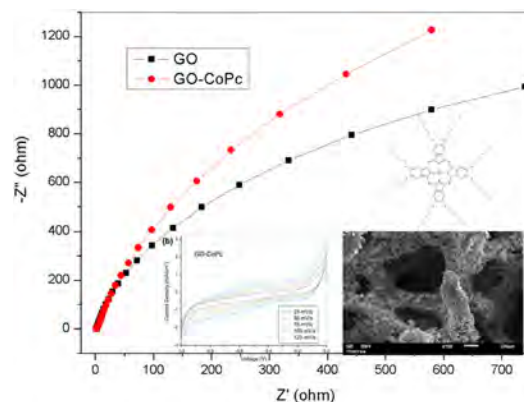
Chandana Pal*, Isabelle Chambrier, Andrew N. Cammidge, A. K. Sharma and Asim K. Ray

Three non-peripherally substituted liquid crystalline bisphthalocyanine compounds have been studied to examine the role of central metal ions lutetium (Lu), and gadolinium (Gd) and substituent chain lengths, *i.e.* octyl (C_8H_{17}) and hexyl (C_6H_{13}), in determining the charge conduction on interdigitated electrodes. The films were annealed at $80^\circ C$ in order to obtain the crystal-columnar mesophase. The combined interpretation of UV-vis spectroscopy, atomic force microscopy and electrical conductivity support that annealing changes the alignment of the Pc units in different way for the three compounds.

**pp. 1616–1621****Hexylsulfanyl-substituted CoPc and GO-CoPc on Ni foam as electroactive material for supercapacitors**

Nevin Taşaltın*, Cihat Taşaltın, Hamide Aydın, Utkan Şahintürk and Ayşe Gül Gürek

For energy storage applications, hexylsulfanyl-substituted CoPc and GO-CoPc electrodes were prepared on Ni foam, and then electrochemical properties of the materials were investigated. The GO-CoPc nanocomposite electrode exhibits 56 mFcm^{-2} at 1.4 mAcm^{-2} current density. The results show that the GO-CoPc nanocomposite electrode is a promising electroactive material for supercapacitors.



pp. 1622–1628

Impedance spectroscopic study on hybrid phthalocyanine/lead sulphide nanocomposite film

Zahra Khozaee*, Isabelle Chambrier, L. Sosa Vargas, Andrew N. Cammidge and Asim K. Ray

The correlated barrier hopping mechanism is found to be responsible for alternating charge transport in a unique organic/inorganic nanocomposite of non-aggregated lead sulphide quantum dots dispersed within a spun film of non-peripherally octakis(hexyl)-substituted metal-free phthalocyanine.

