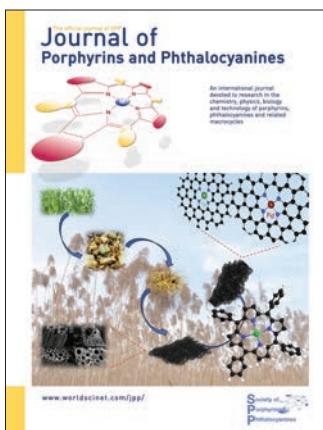


About the Cover



The cover highlights the article that appears in this double issue entitled:

Metalloporphyrin-mediated biomass porous single- and dual-metal M-N-C catalysts with 3d, 4d and 5d electrons for efficient electrocatalyzed nitrogen reductions

submitted by Yingjie Niu, Tingting Gu, Xinyi Dong, Bochao Lin, Zhicheng Wan, Minzhi Li, Haijun Xu*, Weihua Zhu and Xu Liang*.

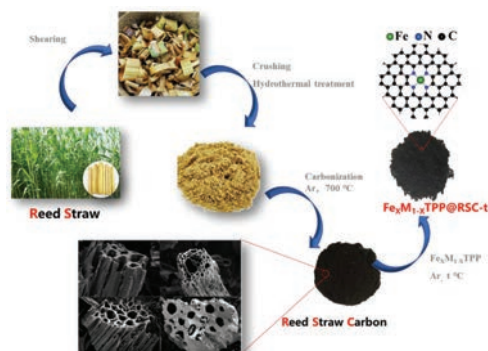
Articles

729–742

Metalloporphyrin-mediated biomass porous single- and dual-metal M-N-C catalysts with 3d, 4d and 5d electrons for efficient electrocatalyzed nitrogen reductions

Yingjie Niu, Tingting Gu, Xinyi Dong, Bochao Lin, Zhicheng Wan, Minzhi Li, Haijun Xu*, Weihua Zhu and Xu Liang*

The synthetic M-N-C catalysts with 3d, 4d and 5d electrons have enhanced and tunable electrochemically catalyzed nitrogen reduction activities. In particular, the dual-metal M-N-C catalyst with 5d electrons exhibits a satisfactory ammonia yield ($E = -0.3$ V, $17.6 \mu\text{g}\cdot\text{mg}^{-1}\cdot\text{h}^{-1}$) and Faraday Efficiency (15.1%).

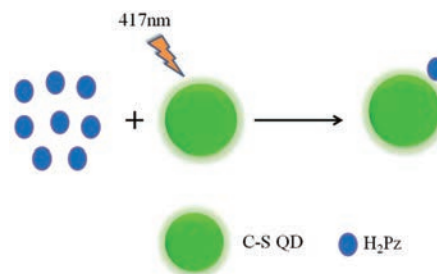


743–753

Porphyrazine: An effective receptor for quantum dots

Subhendu Dey, Subrata Nayak, Sanyukta Bhattacharjee, Shalmali Bhattacharya and Sumanta Bhattacharya*

CdSe/ZnS core/shell quantum dots (C-S QD) undergo effective complexation with free-base porphyrazine (H_2Pz) in solution. The binding constant of the C-S QD/ H_2Pz complex is estimated to be $1.3 \times 10^5 \text{ dm}^3/\text{mol}^{-1}$. A static quenching mechanism prevails in QD photo decay by H_2Pz . H_2Pz may be applied as a selective host for quantum dots.



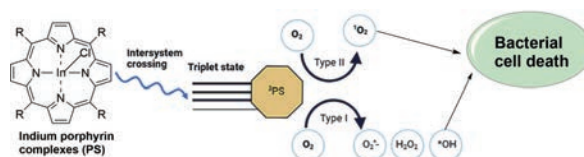
Articles

754–767

Photodynamic antimicrobial activity of indium(III) porphyrin complexes against foodborne pathogens

Margaret W. Murage, Edith K. Amuhaya*, Betty N. Mbatia, Edward K. Muge and Solomon Derese

This study investigates the synthesis, characterization, and biological application of indium(III) porphyrin complexes for photodynamic antimicrobial chemotherapy (PACT) against foodborne pathogens. The complexes, validated through FTIR, mass spectrometry, and NMR spectroscopy, exhibited unique fluorescence emissions, with **P2** showing the highest singlet oxygen production and bacterial photoinactivation. **P2**'s enhanced antimicrobial activity is attributed to the bromine heavy atom effect, which facilitates intersystem crossing and reduces radiative decay. The findings underscore the potential of indium(III) porphyrin complexes in PACT and provide insights into structure-activity relationships for optimizing antimicrobial properties.

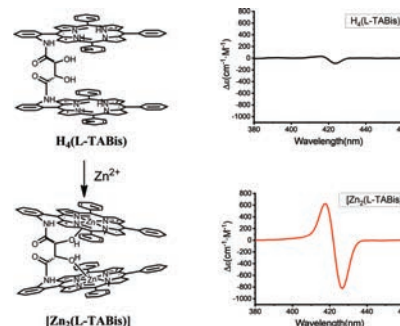


768–775

Enhancement of the CD signal of a tartaric acid amide-linked bisporphyrin by zinc cations

Mengmeng Zhou, Xiaonan Zhu, Chuanjiang Hu* and Yong Wang*

A chiral bisporphyrin containing hydroxy groups in the linker was designed and synthesized. CD spectra show that the intensity of the CD signal increases approximately 12 times upon metalation with Zn²⁺. Our investigation suggests that the Zn-OH coordination interactions lead to the enhanced CD.

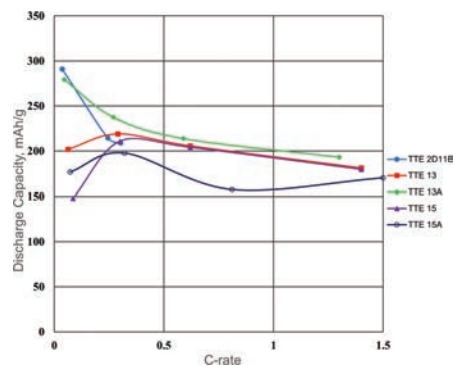


776–785

Phthalocyanine-based solid-state electrolyte for high-capacity and long-life lithium-ion batteries

Leah Lucente, Jacob Lawson*, William Feld, David Firsich, Padmakar Kichambare*, Thomas Jenkins, Stanley Rodrigues and Lawrence Scanlon

A new solid-state electrolyte (SSE) with a low energy of activation for lithium-ion conduction has been designed and tested in an all-solid-state battery with a lithium metal anode and a lithium iron phosphate cathode (LiFePO₄). The cells delivered high discharge capacities of up to 291.3 mAh/g at 23 °C and 194.5 mAh/g at -20 °C. All cells were fabricated in a dry room via solution casting of the soluble SSE onto either an aerosol-jet-deposited or tape-cast LiFePO₄ cathode.



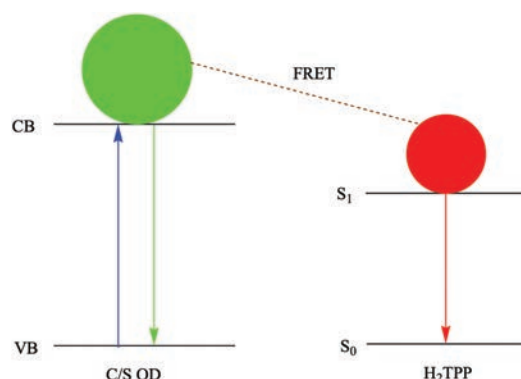
Articles

786–797

Study of complexation and energy transfer phenomenons in core/shell quantum dots-tetraphenyl porphyrin systems in solution

Somnath Nayek, Subrata Nayak, Sumanta Bhattacharya*, Sanyukta Bhattacharjee and Shalmali Bhattacharya

H₂TPP undergoes spontaneous interaction with CdSe/ZnS quantum dots (C/S QD) in solution. C/S QD-H₂TPP self-assembly is quantified by a high value of association constant (*K*) of such a system, i.e., $K_{C/S\ QD-H_2TPP} \sim 4.0 \times 10^5\ \text{dm}^3/\text{mol}$. The bimolecular quenching constant (*k*) of the C/S QD-H₂TPP system ($k_{C/S\ QD-H_2TPP}$) is estimated to be $\sim 5.47 \times 10^{12}\ \text{dm}^3/\text{mol}/\text{sec}$, which suggests the role of static quenching. Photophysical parameters obtained from this work may be suitably utilized for future application of the C/S QD-H₂TPP system in an energy storage unit.

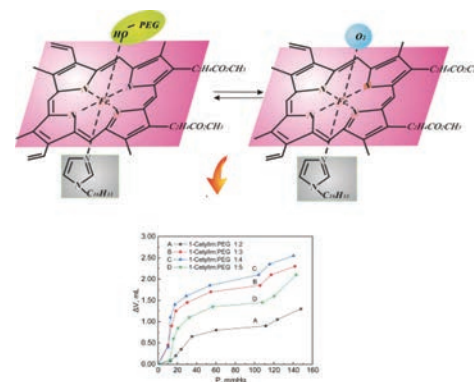


798–805

Effect of ligands on heme dimethyl ester-based hexa-coordinated complexes as oxygen-carrying carriers

Baojuan Zhao, Yiman Lan, Xiaodan Wang, Yan Ma, Ronghu Li, Weizhong Cao and Xiang Wang*

A series of hexa-coordinated oxygen-carrying systems have been constructed, in which oxygen competes with axial ligands for binding with the central metal ion of heme dimethylester iron(II) as an oxygen-carrying component. These systems can effectively carry oxygen, provided that there is at least one strong ligand on the axial coordination site.



806–813

μ-nitrido diiron phthalocyanines: Electron-withdrawing vs electron-donating substituent effect on oxidation reaction catalysis

Olçay Eren, Zeynel Şahin, Fabienne Dumoulin* and Ümit Işçi*

Two derivatives were prepared to investigate the effect of the substitution pattern on *N*-bridged dimeric Fe phthalocyanines, with either electron-withdrawing hexylsulfonyl or with electron-donating hexyloxy substituents.



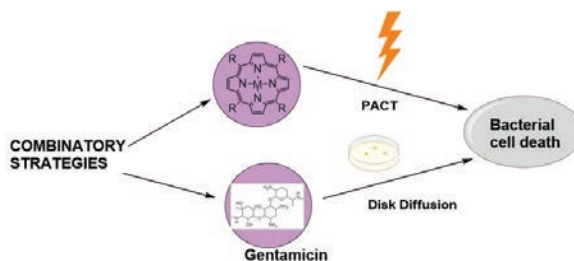
Articles

814–829

Synergistic effect of porphyrin-induced photodynamic antimicrobial chemotherapy combined with Gentamicin against clinically important gram-positive and gram-negative bacteria

Margaret W. Murage, Edith K. Amuhaya*, Betty N. Mbatia, Edward K. Muge and Solomon Derese

This study explores the antibacterial activity of a free base porphyrin and its zinc, indium, and gallium conjugate against both gram-positive and gram-negative bacteria. The indium metallated porphyrin exhibited the highest singlet oxygen yield and photodynamic activity, effectively eradicating bacteria at sub-lethal light doses. When combined with Gentamicin (GEN), the antibacterial efficacy significantly increased, showing larger inhibition zones than GEN alone. This synergy between PACT and antibiotics highlights a promising approach to combat antibiotic-resistant infections.

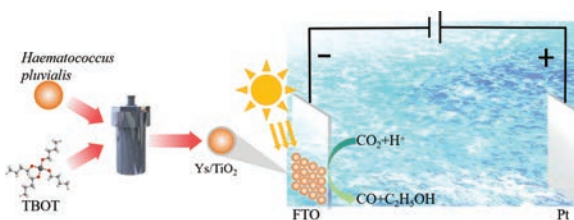


830–838

Nano titanium dioxide coating *Haematococcus pluvialis* enhances photoelectric carbon dioxide reduction performance

Xiao Yu, Chen Yuantao*, Zhang Wei and Shao Liming

The preparation of titanium dioxide-coated *Haematococcus pluvialis* composites (Ys/TiO₂) achieved efficient charge separation, leading to superior photoelectrocatalytic CO₂ reduction performance, owing to the dye-sensitization effect of astaxanthin within *H. pluvialis* cells and the electron-hole pairs in Ys/TiO₂ composites.



839–852

Supramolecular interaction between *N*-methylfulleropyrrolidine and porphyrazine studied in solution

Goutam Krishna Das, Subrata Nayak, Shalmali Bhattacharya, Shrabanti Banerjee, Suravi Paul and Sumanta Bhattacharya*

N-methylfulleropyrrolidine (**A**) underwent a supramolecular interaction with free-base porphyrazine (H₂Pz) in toluene. The interaction between **A** and H₂Pz was favored by a charge transfer (CT) when the CT absorption band was located at 533 nm. The average binding constant value for the **A**-H₂Pz system was estimated at 2.254 x 10⁴ dm³·mol⁻¹. The HOMO-LUMO energy gap (~2.330 eV) of the **A**-H₂Pz system fit remarkably well with the reported CT energy value of the **A**-H₂Pz system.

