

Applied Surface Science

A JOURNAL DEVOTED TO APPLIED PHYSICS
AND CHEMISTRY OF SURFACES AND INTERFACES

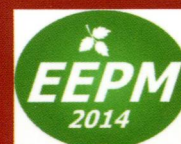
H. RUDOLPH EDITOR-IN-CHIEF

SPECIAL ISSUE:

Photocatalytic materials for energy and environmental applications

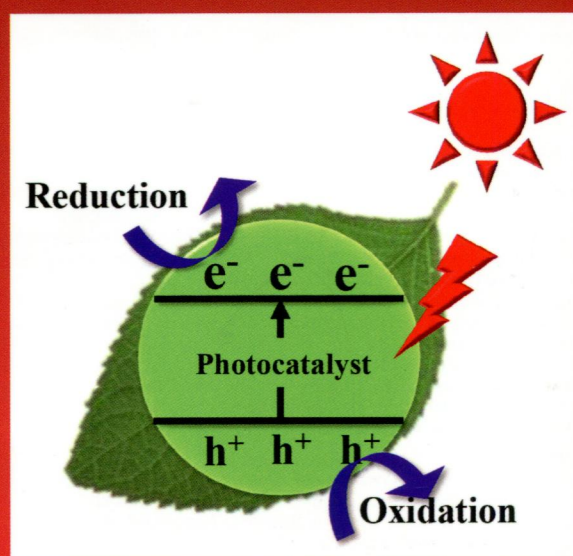
Guest Editors:

Jiaguo Yu and Mietek Jaroniec



EDITORS

J.G. CHEN
M. DINESCU
A.R. GONZÁLEZ-ELIPE
J. GREELEY
W. HUANG
P. KINGSHOTT
H. KOBAYASHI
T. KOMEDA
L. KÖVÉR
T. LIPPERT
C.F. MCCONVILLE
M.F. MONTEMOR
R.L. OPILA
P. SCHAAF
A. TEPLYAKOV
R. WALLACE



applied surface science

Contents

Volume 319 (2014)

SPECIAL ISSUE: Photocatalytic materials for energy and environmental applications

Editorial

Photocatalytic materials for energy and environmental applications
J. Yu and M. Jaroniec

Review

Comparative activity of TiO₂ microspheres and P25 powder for organic degradation: Implicative importance of structural defects and organic adsorption
C. Wang, H. Liu, Y. Liu, G. He and C. Jiang

TiO₂ Photocatalysts

Synthesis and photocatalytic activity of graphene based doped TiO₂ nanocomposites
Y. Gu, M. Xing and J. Zhang

Reprint of "Photocatalytic reduction of CO₂ on MgO/TiO₂ nanotube films"
Q. Li, L. Zong, C. Li and J. Yang

Well-dispersed Pt nanocrystals on the heterostructured TiO₂/SnO₂ nanofibers and the enhanced photocatalytic properties
L. Zhang, Y. Li, Q. Zhang and H. Wang

TiO₂ functionalization for efficient NO_x removal in photoactive cement
S. Karapati, T. Giannakopoulou, N. Todorova, N. Boukos, S. Antiohos, D. Papageorgiou, E. Chaniotakis, D. Dimotikali and C. Trapalis

Modification of MWCNT@TiO₂ core-shell nanocomposites with transition metal oxide dopants for photoreduction of carbon dioxide into methane
M.M. Gui, S.-P. Chai and A.R. Mohamed

Photocatalytic and photoelectrochemical oxidation mechanisms of methanol on TiO₂ in aqueous solution
A.Y. Ahmed, T.A. Kandel, I. Ivanova and D. Bahnemann

Combination study of DFT calculation and experiment for photocatalytic properties of S-doped anatase TiO₂
R. Liu, X. Zhou, F. Yang and Y. Yu

Synthesis and characterization of high photocatalytic activity and stable Ag₃PO₄/TiO₂ fibers for photocatalytic degradation of black liquor
L. Cai, Q. Long and C. Yin

A situ hydrothermal synthesis of SrTiO₃/TiO₂ heterostructure nanosheets with exposed (0 0 1) facets for enhancing photocatalytic degradation activity
X. Yue, J. Zhang, F. Yan, X. Wang and F. Huang

Dye-sensitized solar cells based on TiO₂ nanoparticles/nanobelts double-layered film with improved photovoltaic performance
J. Fan, Z. Li, W. Zhou, Y. Miao, Y. Zhang, J. Hu and G. Shao 75

Facile synthesis, structure and visible light photocatalytic activity of recyclable ZnFe₂O₄/TiO₂
X. Zhu, F. Zhang, M. Wang, J. Ding, S. Sun, J. Bao and C. Gao 83

Fabrication, characterization and application of a reusable immobilized TiO₂-PANI photocatalyst plate for the removal of reactive red 4 dye
S. Razak, M.A. Nawi and K. Haitham 90

P-doped TiO₂ with superior visible-light activity prepared by rapid microwave hydrothermal method
J. Niu, P. Lu, M. Kang, K. Deng, B. Yao, X. Yu and Q. Zhang 99

Enhanced visible light photocatalytic degradation of methylene blue by F-doped TiO₂
W. Yu, X. Liu, L. Pan, J. Li, J. Liu, J. Zhang, P. Li, C. Chen and Z. Sun 107

Composite TiO₂/clays materials for photocatalytic NO_x oxidation
N. Todorova, T. Giannakopoulou, S. Karapati, D. Petridis, T. Vaimakis and C. Trapalis 113

Methylene blue photocatalytic mineralization under visible irradiation on TiO₂ thin films doped with chromium
C. Diaz-Urbe, W. Vallejo and W. Ramos 121

Synthesis of surface plasmon resonance (SPR) triggered Ag/TiO₂ photocatalyst for degradation of endocrine disturbing compounds
K.H. Leong, B.L. Gan, S. Ibrahim and P. Saravanan 128

Flexible N-doped TiO₂/C ultrafine fiber mat and its photocatalytic activity under simulated sunlight
N. Wu, Y. Wang, Y. Lei, B. Wang and C. Han 136

A novel route for the production of TiO₂ photocatalysts with low energy gap, via Triton-X and oleic acid surfactants
A. Athanasiou, A. Mitsionis, T. Vaimakis, P. Pomonis, D. Petrakis, L. Loukatzikou, N. Todorova, C. Trapalis and S. Ladas 143

Singular effect of crystallite size on the charge carrier generation and photocatalytic activity of nano-TiO₂
M. Strauss, M. Pastorello, F.A. Sigoli, J.M. de Souza e Silva and I.O. Mazali 151

A facile method to synthesize the photocatalytic TiO₂/montmorillonite nanocomposites with enhanced photoactivity
D. Chen, H. Zhu and X. Wang 158

Vectorial doping-promoting charge transfer in anatase TiO₂ {0 0 1} surface
P. Zhou, J. Wu, W. Yu, G. Zhao, G. Fang and S. Cao 167

Photocatalytic activity of titanium dioxide modified by Fe₂O₃ nanoparticles
D. Wodka, R.P. Socha, E. Bielańska, M. Elźbieciak-Wodka, P. Nowak and P. Warszyński 173

(Contents continued on IBC)



(Continued from outside back cover)

- Effect of the composition of Ti alloy on the photocatalytic activities of Ti-based oxide nanotube arrays prepared by anodic oxidation
D. Tang, Y. Wang, Y. Zhao, Y. Yang, L. Zhang and X. Mao 181
- Effect of calcination temperature on physical parameters and photocatalytic activity of mesoporous titania spheres using chitosan/poly(vinyl alcohol) hydrogel beads as a template
R. Jiang, H.-Y. Zhu, H.-H. Chen, J. Yao, Y.-Q. Fu, Z.-Y. Zhang and Y.-M. Xu 189
- Reprint of "Influence of chitosan-PEG binary template on the crystallite characteristics of sol-gel synthesised mesoporous nanotitania photocatalyst"
T. Preethi, B. Abarna and G.R. Rajarajeswari 197
- Enhanced solar water splitting of electron beam irradiated titania photoanode by electrostatic spray deposition
M.G. Mali, H. Yoon, S. An, J.-Y. Choi, H.-Y. Kim, B.C. Lee, B.N. Kim, J.H. Park, S.S. Al-Deyab and S.S. Yoon 205
- ZnO Photocatalysts**
- One-step synthesis of bird cage-like ZnO and other controlled morphologies: Structural, growth mechanism and photocatalytic properties
S. Yang, J. Wang, X. Li, H. Zhai, D. Han, B. Wei, D. Wang and J. Yang 211
- Increased photocatalytic activity of tube-brush-like ZnO nanostructures fabricated by using PVP nanofibers as templates
X. Chen, Y. Zhai, J. Li, X. Fang, F. Fang, X. Chu, Z. Wei and X. Wang 216
- Synthesis, characterization and photocatalytic activity of annealing dependent quasi spherical and capsule like ZnO nanostructures
M. Pudukudy, A. Hetieqa and Z. Yaakob 221
- Enhanced visible-light photocatalytic activity of Fe/ZnO for rhodamine B degradation and its photogenerated charge transfer properties
S. Yi, J. Cui, S. Li, L. Zhang, D. Wang and Y. Lin 230
- Facile one-step synthesis of N-doped ZnO micropolyhedrons for efficient photocatalytic degradation of formaldehyde under visible-light irradiation
C. Wu 237
- Bi-based Photocatalysts**
- Microwave-assisted synthesis of self-assembled $\text{BiO}_{1.84}\text{H}_{0.08}$ hierarchical nanostructures as a new photocatalyst
P. Hu, D. Hou, H. Shi, C. Chen, Y. Huang and X. Hu 244
- Hydrothermal synthesis of a novel BiErWO_6 photocatalyst with wide spectral responsive property
Z. Zhang, W. Wang and Y. Zhou 250
- Hydrothermal fabrication of N-doped $(\text{BiO})_2\text{CO}_3$: Structural and morphological influence on the visible light photocatalytic activity
F. Dong, R. Wang, X. Li and W.-K. Ho 256
- Preparation and photocatalytic activity of porous $\text{Bi}_5\text{O}_7\text{I}$ nanosheets
J. Yang, L. Xu, C. Liu and T. Xie 265
- BiPO_4 /reduced graphene oxide composites photocatalyst with high photocatalytic activity
Y. Zhang, B. Shen, H. Huang, Y. He, B. Fei and F. Lv 272
- CdS Photocatalysts**
- Fabrication of CdS/CdSe bilayer thin films by chemical bath deposition and electrodeposition, and their photoelectrochemical properties
C. Lu, L. Zhang, Y. Zhang, S. Liu and G. Liu 278
- Optical signal demultiplexing and conversion in the fullerene-oligothiophene-CdS system
K. Lewandowska, A. Podborska, P. Kwolek, T.-D. Kim, K.-S. Lee and K. Szaciłowski 285
- Ion-exchange synthesis of one-dimensional $\text{Cd}_2\text{Ge}_2\text{O}_6/\text{CdS}$ core-shell composites and their enhanced visible-light photocatalytic activity
J. Liu and G. Zhang 291
- Synthesis of CdS/BiOBr composite and its enhanced photocatalytic degradation for Rhodamine B
W. Cui, W. An, L. Liu, J. Hu and Y. Liang 298
- Ag-based Photocatalysts**
- Synthesis and characterization of graphene oxide modified AgBr nanocomposites with enhanced photocatalytic activity and stability under visible light
D. Zhang, H. Tang, Y. Wang, K. Wu, H. Huang, G. Tang and J. Yang 306
- Enhancement of the visible light activity and stability of Ag_2CO_3 by formation of AgI/ Ag_2CO_3 heterojunction
C. Yu, L. Wei, W. Zhou, J. Chen, Q. Fan and H. Liu 312
- Photoactivity and stability of Ag_2WO_4 for organic degradation in aqueous suspensions
H. Chen and Y. Xu 319
- Dependence of metallic Ag on the photocatalytic activity and photoinduced stability of Ag/AgCl photocatalyst
J. Tian, R. Liu, G. Wang, Y. Xu, X. Wang and H. Yu 324
- Visible photocatalysis and photostability of Ag_3PO_4 photocatalyst
L. Luo, Y. Li, J. Hou and Y. Yang 332
- 2D Photocatalytic Materials**
- Effects of hydrazine hydrate treatment on the performance of reduced graphene oxide film as counter electrode in dye-sensitized solar cells
L. Qiu, H. Zhang, W. Wang, Y. Chen and R. Wang 339
- Noble-metal-free $\text{g-C}_3\text{N}_4/\text{Ni}(\text{dmgH})_2$ composite for efficient photocatalytic hydrogen evolution under visible light irradiation
S.-W. Cao, Y.-P. Yuan, J. Barber, S.C.J. Loo and C. Xue 344
- Other Photocatalysts**
- Synthesis, characterization and photocatalytic activity of cubic-like CuCr_2O_4 for dye degradation under visible light irradiation
W. Yuan, X. Liu and L. Li 350
- Modified Fe_3O_4 -hydroxyapatite nanocomposites as heterogeneous catalysts in three UV, Vis and Fenton like degradation systems
S. Valizadeh, M.H. Rasoulifard and M.S.S. Dorraji 358
- Preparation of self-cleaning surfaces with a dual functionality of superhydrophobicity and photocatalytic activity
E.J. Park, H.S. Yoon, D.H. Kim, Y.H. Kim and Y.D. Kim 367
- Photocatalytic activity of $\text{NaTaO}_3:\text{La}$ prepared under different atmospheres
Z. Wu, G. Li, F. Zhang and W. Zhang 372