

# 无机化学学报

2016 年

第 32 卷

第 10 期

## 目 次

### 综 述

钴基双金属氧化物的制备及其在电化学储能领域的应用

.....黄国勇 徐盛明 杨 越 程永宾 李 娟(1693)

### 论 文

LaCoO<sub>3</sub> 晶格结构内外 Mg 的同步改性及其光催化性能

.....孙慧华 杨汉培 崔素珍 聂 坤 吴俊明(1704)

由大茴香酸与含氮杂环配体构筑的锌、铜配合物的水热合成、晶体结构与荧光性质

.....陈志敏 杨颖群 毛芳芳 邝代治 王剑秋 张复兴(1713)

基于油酸辅助水热法制备 NaLuF<sub>4</sub>:Ln<sup>3+</sup> 及光谱性质

.....邱克书 姜 浩 闫景辉 姚 爽 康振辉(1723)

钴掺杂 Sr<sub>1.5</sub>La<sub>0.5</sub>MnO<sub>4</sub> 的合成及高温电化学性能研究.....范宇航 孙丽萍 霍丽华 赵 辉

Jean-Marc Bassat Aline Rougier Sébastien Fourcade Jean-Claude Grenier(1730)

热处理温度对溶剂热合成 Co<sub>3</sub>O<sub>4</sub> 纳米片气敏和吸附性能之影响

.....李晓婷 张乐喜 尹 静 赵立新 别利剑(1739)

含两个酰胺基团的卟啉二聚体分子间氢键引起的发光光谱红移

.....骆开均 张仕林 苏祎伟 李 权(1747)

HNO 自由基与 O<sub>2</sub> 反应机理的理论研究.....胡 威 陈淑勇 刘伯潭(1757)

活性炭催化碳酸二甲酯水解行为的研究.....郝志强 张国强 琚裕波 李 忠(1763)

稀土掺杂 Lu<sub>3</sub>Al<sub>5</sub>O<sub>12</sub> 荧光粉的发光特性及能量传递

.....田燕娜 杜 英 沈巧巧 焦 艳 马 婧 柏朝晖(1771)

功能化碳纳米管作为固体碱用于 Knoevenagel 缩合

.....杨新玲 王 焘 龚慧萍 华伟明 乐英红 高 滋(1777)

三个基于 3-(2,5-二羧基苯基)-吡啶羧酸的 Cu(II)、Mn(II)配合物的结构及磁性

.....王淑菊 蔺明明 熊 刚 由立新 丁 苒 孙亚光(1783)

氟离子与磺化反应改性多壁纳米碳管催化剂的制备、表征及催化酯化反应合成油酸甲酯性能

.....舒 庆 侯小鹏 唐国强 刘峰生 袁 红 许宝泉 张彩霞 王金福(1791)

含有 TiO<sub>2</sub> 刺球散射中心光阳极的设计及其在染料敏化太阳能电池的应用

.....杨亚辉 吕玉霞 黎 航 占发琦(1802)

基于柔性多羧酸配体 H<sub>3</sub>TCOPM 构筑的 Co(II)配合物的合成与结构

.....曹玲玲 俞 慧 聂爱杨 袁爱华(1809)

Ru/Ce(OH)CO<sub>3</sub> 纳米复合材料催化氨硼烷水解产氢(英文)

.....陈健民 卢章辉 熊丽华(1816)

两个基于半刚性双甲基苯并咪唑配体的螺旋型镉配位聚合物(英文)	.....许春莺	唐四叶	苗少斌	吉保明(1825)					
基于二吡唑配体的镉配合物:温度诱导自组装、荧光和光催化应用(英文)	.....李慧军	闫玲玲	王元	徐周庆	徐君	吴伟娜(1831)			
原位水解沉积制备高效氮化钽微球太阳能分解水光阳极(英文)	.....杨立恒	罗文俊	李明雪	邹志刚(1839)					
三个基于 1,5-二(2-乙基苯并咪唑基)-戊烷柔性配体的镉配合物(英文)	.....王岭	徐爽	孟伟	韩超	俞继康	俞书琪	何章兴	戴磊	侯红卫(1847)
大空间位阻 $\beta$ -二亚胺镁配合物的合成、晶体结构及硅氢化反应(英文)	.....马猛涛	沈兴超	于志娟	姚薇薇	杜丽婷	徐莉(1857)			
Cu 含量对 Pd-Cu/铝土矿 CO 氧化催化剂结构和性能的影响(英文)	.....詹瑛瑛	徐聪波	陈崇启	刘弦	马永德	江莉龙(1867)			
基于半刚性的 4-羧基苯乙酸和富氮共配体组装的 Zn(II)/Cd(II)配位聚合物的合成、结构和性质(英文)	.....鞠丰阳	李云平	李桂连	刘广臻	辛凌云	李晓玲(1876)			

# CHINESE JOURNAL OF INORGANIC CHEMISTRY

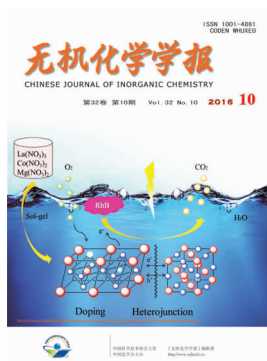
Vol.32

No.10

Oct. 2016

## CONTENTS

### Cover



Simultaneous Mg-Modification Inside and Outside of LaCoO<sub>3</sub> Lattice and Their Photocatalytic Properties

SUN Hui-Hua, YANG Han-Pei, CUI Su-Zhen, NIE Kun, WU Jun-Ming

DOI:10.11862/CJIC.2016.223

*Chinese J. Inorg. Chem.*, **2016**,**32**:1704-1712

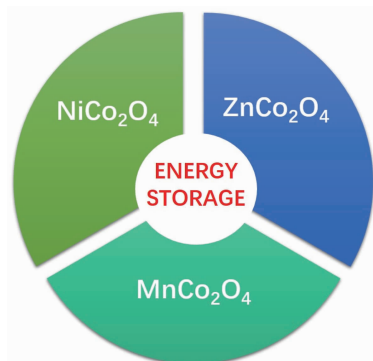
### Reviews

Preparation of Cobalt-Based Bi-Metal-Oxides and the Application in the Field of Electrochemical Energy Storage

HUANG Guo-Yong, XU Sheng-Ming,  
YANG Yue, CHENG Yong-Bin, LI Juan

DOI:10.11862/CJIC.2016.244

*Chinese J. Inorg. Chem.*, **2016**,**32**:1693-1703



Recent advances of cobalt-based bi-metal-oxides (NiCo<sub>2</sub>O<sub>4</sub>, ZnCo<sub>2</sub>O<sub>4</sub>, MnCo<sub>2</sub>O<sub>4</sub>, et al.) and these composites as electrode materials of Li-ion batteries and supercapacitors are reviewed in this paper.

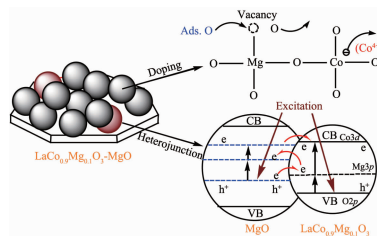
### Articles

Simultaneous Mg-Modification Inside and Outside of LaCoO<sub>3</sub> Lattice and Their Photocatalytic Properties

SUN Hui-Hua, YANG Han-Pei, CUI Su-Zhen,  
NIE Kun, WU Jun-Ming

DOI:10.11862/CJIC.2016.223

*Chinese J. Inorg. Chem.*, **2016**,**32**:1704-1712



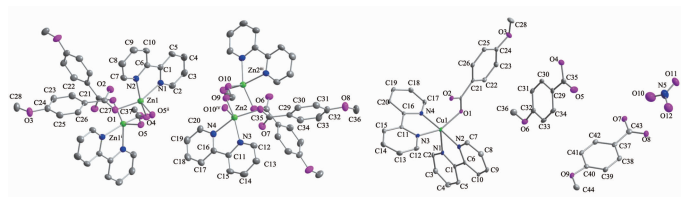
The Mg-doping inside LaCoO<sub>3</sub> lattice and heterojunctions between MgO and LaCoO<sub>3</sub> were synchronously acquired. The synergistic promotion by synchronous modification of LaCoO<sub>3</sub> in its photocatalytic activity for RhB degradation is proposed.

# Hydrothermal Syntheses, Crystal Structures and Fluorescence Properties of Copper/Zinc Complexes Based on Methoxybenzoic Acid and Nitrogen-Containing Heterocyclic Compound

CHEN Zhi-Min, YANG Ying-Qun,  
MAO Fang-Fang, KUANG Dai-Zhi,  
WANG Jian-Qiu, ZHANG Fu-Xing

DOI:10.11862/CJIC.2016.226

*Chinese J. Inorg. Chem.*, **2016**,**32**:1713-1722



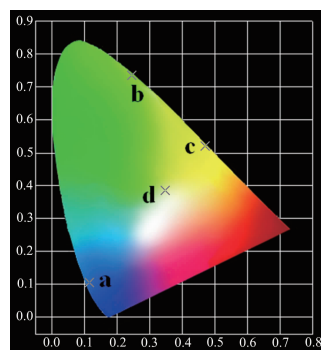
The complexes  $[\text{Zn}(\text{mba})(\text{bipy})(\text{HCOO})]_n$  (**1**) and  $[\text{Cu}(\text{mba})(\text{bipy})_2] \cdot 2\text{Hmba}$  (**2**) were characterized by IR spectrum, thermal gravimetric analysis, single crystal X-ray diffraction and fluorescence analysis. In **1**, Zn(II) ion is five-coordinated with a distorted trigonal bipyramidal coordination geometry. Each  $\text{HCOO}^-$  ligand bridges two Zn(II) ions, forming a 1D chain. In **2**, the coordination units are connected by the  $\pi$ - $\pi$  packing between aromatic rings to form 1D supramolecular chain. Complex **1** shows a strong fluorescent emission ( $\lambda_{\text{max}}=327 \text{ nm}$ ).

# Synthesis and Spectral Properties of $\text{NaLuF}_4:\text{Ln}^{3+}$ Based on Oleic Acid Assisted Hydrothermal Method

DI Ke-Shu, JIANG Hao, YAN Jing-Hui,  
YAO Shuang, KANG Zhen-Hui

DOI:10.11862/CJIC.2016.239

*Chinese J. Inorg. Chem.*, **2016**,**32**:1723-1729



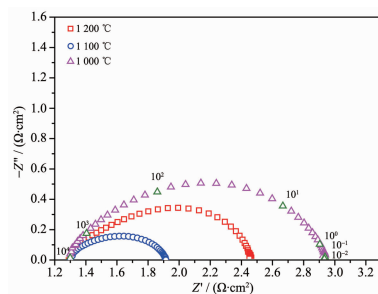
In the  $\text{NaLuF}_4:0.20\text{Yb}^{3+}$ ,  $0.005\text{Er}^{3+}$ ,  $0.005\text{Tm}^{3+}$  sample, the white emission ( $x=0.335$ ,  $y=0.385$ ) was achieved.

# Synthesis and High Temperature Electrochemical Properties of Co-doped $\text{Sr}_{1.5}\text{La}_{0.5}\text{MnO}_4$

FAN Yu-Hang, SUN Li-Ping, ZHAO Hui,  
HUO Li-Hua, Jean-Marc Bassat,  
Aline Rougier, Sébastien Fourcade,  
Jean-Claude Grenier

DOI:10.11862/CJIC.2016.207

*Chinese J. Inorg. Chem.*, **2016**,**32**:1730-1738



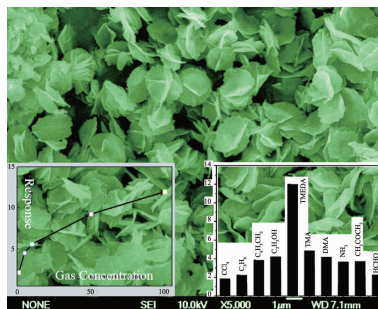
The high temperature ORR properties of  $\text{Sr}_{1.5}\text{La}_{0.5}\text{Mn}_{1-x}\text{Co}_x\text{O}_4$  cathode are promoted by cobalt doping.  $\text{Sr}_{1.5}\text{La}_{0.5}\text{Mn}_{0.7}\text{Co}_{0.3}\text{O}_4$  exhibits the lowest polarization resistance of  $0.62 \Omega \cdot \text{cm}^2$  at  $700^\circ\text{C}$  in air.

# Effect of Calcination Temperature on Gas-Sensing and Adsorption Performance of $\text{Co}_3\text{O}_4$ Nanosheets from Solvothermal Synthesis

LI Xiao-Ting, ZHANG Le-Xi,  
YIN Jing, ZHAO Li-Xin, BIE Li-Jian

DOI:10.11862/CJIC.2016.243

*Chinese J. Inorg. Chem.*, **2016**,**32**:1739-1746



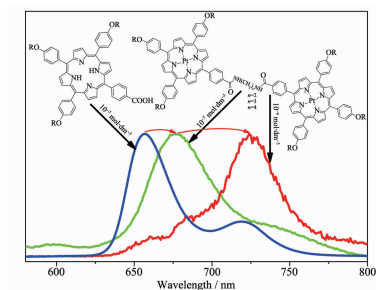
Thickness of  $\text{Co}_3\text{O}_4$  nanosheets were tuned from solvothermal condition and heat treatment temperature, resulting in the difference of specific surface area, gas-sensing and adsorption performance. The thinner the nanosheets thickness, the higher the gas-sensing response and adsorption efficiency.

# Dimeric Porphyrins and Platinum (II) Complexes: Red-Shifted Emission from Hydrogen Bonds Between Dimeric Porphyrins

LUO Kai-Jun, ZHANG Shi-Lin, SU Yi-Wei,  
LI Quan

DOI:10.11862/CJIC.2016.218

*Chinese J. Inorg. Chem.*, **2016**,**32**:1747-1756



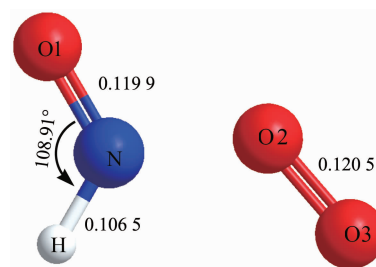
Dimeric porphyrin Pt(II) complexes that are bridged by two amide groups show the concentration dependence photoluminescence (PL) spectra, which originated intermolecular interaction between Pt (II) complexes dimers and strengthened by hydrogen bond form amide groups.

# Theoretical Mechanism Study of the HNO+O<sub>2</sub> Reaction

HU Wei, CHEN Shu-Yong, LIU Bo-Tan

DOI:10.11862/CJIC.2016.236

*Chinese J. Inorg. Chem.*, **2016**,**32**:1757-1762



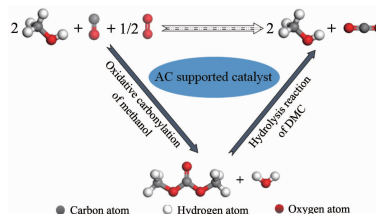
The reaction mechanisms of HNO radical with O<sub>2</sub> has been figured out using density functional theory at the B3LYP/6-311++ G (d, p) level. HNO +O<sub>2</sub> possesses two products: HOONO and HNO<sub>3</sub>. HOONO is the main product, and it has three isomers.

# Study on the Hydrolysis of Dimethyl Carbonate on Activated Carbon

HAO Zhi-Qiang, ZHANG Guo-Qiang,  
JU Yu-Bo, LI Zhong

DOI:10.11862/CJIC.2016.242

*Chinese J. Inorg. Chem.*, **2016**,**32**:1763-1770



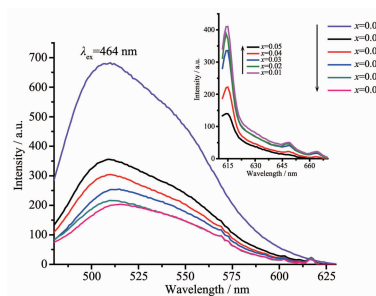
Activated carbon (AC) supported catalyst with good catalytic activity in the oxidative carbonylation of methanol can also catalyze the hydrolysis reaction of DMC. And the influence factors of this undesired hydrolysis process catalyze by AC were illustrated.

# Luminescence and Energy Transfer of Rare Earth Doped Lu<sub>3</sub>Al<sub>5</sub>O<sub>12</sub> Phosphor

TIAN Yan-Na, DU Ying, SHEN Qiao-Qiao,  
JIAO Yan, MA Jing, BAI Zhao-Hui

DOI:10.11862/CJIC.2016.224

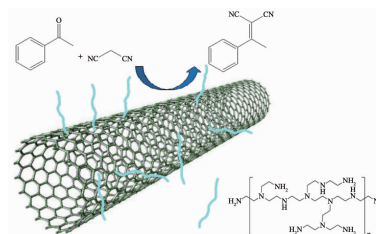
*Chinese J. Inorg. Chem.*, **2016**,**32**:1771-1776



Lu<sub>3</sub>Al<sub>5</sub>O<sub>12</sub>:Ce, Sm phosphors were synthesized by high temperature solid-state method. The introduction of Sm<sup>3+</sup> can increase the red component of the emission spectrum of Lu<sub>3</sub>Al<sub>5</sub>O<sub>12</sub>:Ce, Sm phosphors.

# Functionalized Carbon Nanotubes as Solid Bases for Knoevenagel Condensation

YANG Xin-Ling, WANG Tao,  
GONG Hui-Ping, HUA Wei-Ming,  
YUE Ying-Hong, GAO Zi



Polyethyleneimine functionalized carbon nanotube is very active in Knoevenagel condensation of benzaldehyde and malononitrile. Its catalytic stability can be greatly enhanced by the pretreatment of carbon nanotube using strong acid before deposition.

DOI:10.11862/CJIC.2016.241

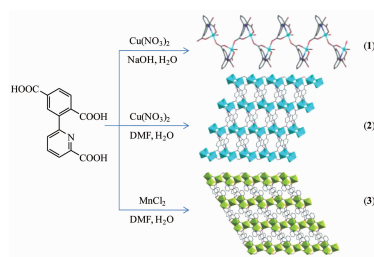
*Chinese J. Inorg. Chem.*, **2016**,**32**:1777-1782

### Three Coordination Polymers of Cu(II)/Mn(II) Based on 3-(2,5-Dicarboxylphenyl)picolinic Acid: Structure and Magnetism

WANG Shu-Ju, LIN Ming-Ming,  
XIONG Gang, YOU Li-Xin, DING Fu,  
SUN Ya-Guang

DOI:10.11862/CJIC.2016.222

*Chinese J. Inorg. Chem.*, **2016**,**32**:1783-1790



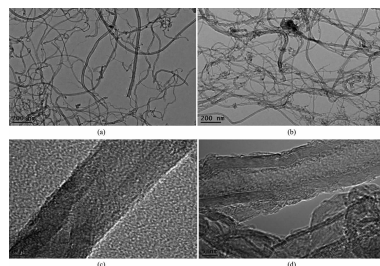
The hydrothermal reaction of 3-(2,5-dicarboxylphenyl)picolinic acid ( $H_3dppa$ ) and Cu(II)/Mn(II) gave three coordination polymers,  $[Cu(Hdppa)(H_2O)]_n$  (**1**),  $\{[Cu_2(dppa)(\mu_2OH)(H_2O)] \cdot H_2O\}_n$  (**2**) and  $\{[Mn_3(dppa)_2(H_2O)_4] \cdot 2H_2O\}_n$  (**3**). Strong ferromagnetic inter-actions exist in **1** and **2**, and there was antiferromagnetic interaction between the neighboring Mn(II) ions in **3**.

### Sulfonation Reaction and F<sup>-</sup>-Modified Multi-wall Carbon Nanotubes Catalyst: Preparation, Characterization and Performance in the Esterification Reaction for the Synthesis of Methyl Oleate

SHU Qing, HOU Xiao-Peng, TANG Guo-Qiang,  
LIU Feng-Sheng, YUAN Hong, XU Bao-Quan,  
ZHANG Cai-Xia, WANG Jin-Fu

DOI:10.11862/CJIC.2016.238

*Chinese J. Inorg. Chem.*, **2016**,**32**:1791-1801



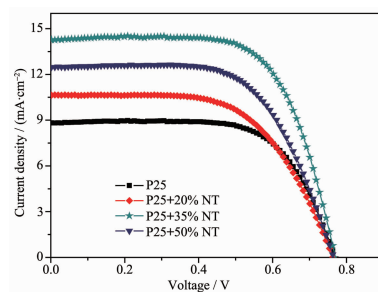
Because F has strong electro-negativity and S=O can produce electronic induction effect, a strong interaction occurred between S=O and F, resulting the formation of F-S bond, which increased the S=O electron-withdrawing effect further and improved the system charge imbalance of  $SO_4^{2-}/MWCNTs$  catalyst.

### Design of Photoanodes with TiO<sub>2</sub> Bulb Scattering Center and Their Application in Dye Sensitized Solar Cells

YANG Ya-Hui, LÜ Yu-Xia, LI Hang,  
ZHAN Fa-Qi

DOI:10.11862/CJIC.2016.235

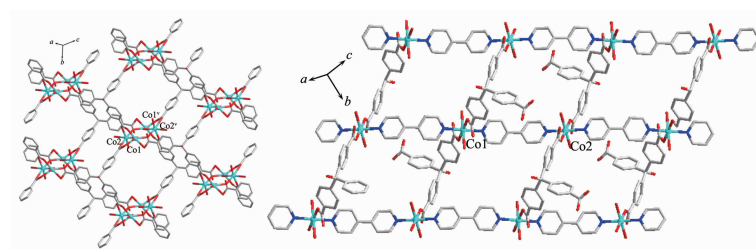
*Chinese J. Inorg. Chem.*, **2016**,**32**:1802-1808



When the mass ratio of thorny TiO<sub>2</sub> (NT) powder is 35%, the highest efficiency (7.38%) of DSSCs based on P25/NT hybrid films was obtained, and the photocurrent density is  $14.30 \text{ mA} \cdot \text{cm}^{-2}$ .

### Syntheses and Structures of Co(II) Complexes Based on a Flexible Polycarboxylic Ligand H<sub>3</sub>TCOPM

CAO Ling-Ling, YU Hui, NIE Ai-Yang,  
YUAN Ai-Hua



The *in situ* reaction of triphenylmethane-4,4',4''-tricarboxylic acid ( $H_3TCOPM$ ),  $Co^{2+}$  ions and N-donor ligands (4,4'-bipy) isolated two coordination polymers  $\{Co_2(\alpha-OH-TCOPM)(OH)(H_2O)_4 \cdot DMF\}_n$  (**1**) and  $\{Co_3(\alpha-OH-TCOPM)_2(4,4'-bipy)_3(H_2O)_6 \cdot 2H_2O\}_n$  (**2**), which showed 2D layered structures and exhibited high thermal stabilities.

DOI:10.11862/CJIC.2016.206

*Chinese J. Inorg. Chem.*, **2016**,**32**:1809-1815

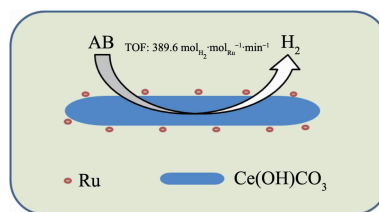


## Hydrolysis of Ammonia Borane by Ru/Ce(OH)CO<sub>3</sub> Nanocomposites for Hydrogen Production (English)

CHEN Jian-Min, LU Zhang-Hui,  
XIONG Li-Hua

DOI:10.11862/CJIC.2016.228

*Chinese J. Inorg. Chem.*, **2016**,**32**:1816-1824



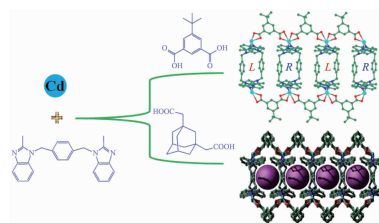
Ru/Ce(OH)CO<sub>3</sub> nanocomposites are synthesized by a facile method, which exhibited excellent catalytic activity for hydrogen generation from the hydrolysis of ammonia borane (AB) at room temperature.

## Two Helical Cadmium Coordination Polymers Based on Semi-rigid Bis(methylbenzimidazole) Ligand (English)

XU Chun-Ying, TANG Si-Ye, MIAO Shao-Bin,  
JI Bao-Ming

DOI:10.11862/CJIC.2016.231

*Chinese J. Inorg. Chem.*, **2016**,**32**:1825-1830



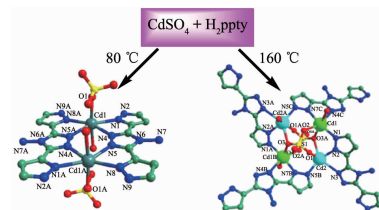
By varying the spacers of dicarboxylic acid co-ligands, two cadmium coordination polymers have been obtained and exhibit different helical structure.

## Cd Complexes Based on Dipyrazolyl Ligand: Temperature-Driven Assembly, Luminescent and Application in Photocatalysis (English)

LI Hui-Jun, YAN Ling-Ling, WANG Yuan,  
XU Zhou-Qing, XU Jun, WU Wei-Na

DOI:10.11862/CJIC.2016.229

*Chinese J. Inorg. Chem.*, **2016**,**32**:1831-1838



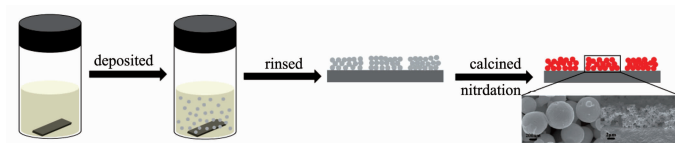
Two Cd(II) complexes have been obtained through the same reaction conditions except for different temperatures. The final structures of **1** and **2** containing binuclear and tetranuclear clusters, respectively, are obviously different and exert different influences on the structural difference and then produce different photocatalytic and luminescent properties.

## In Situ Hydrolysis Deposition of an Efficient Ta<sub>3</sub>N<sub>5</sub> Microsphere Photoanode for Solar Water Splitting (English)

YANG Li-Heng, LUO Wen-Jun, LI Ming-Xue,  
ZOU Zhi-Gang

DOI:10.11862/CJIC.2016.330

*Chinese J. Inorg. Chem.*, **2016**,**32**:1839-1846



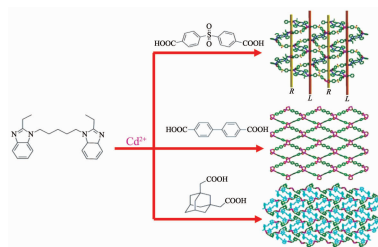
A microsphere Ta<sub>3</sub>N<sub>5</sub> photoanode with a high photocurrent of ~6.6 mA·cm<sup>-2</sup> at 1.6 V vs RHE was synthesized by a facile *in situ* hydrolysis deposition method.

### Three Cd(II) Coordination Polymers Based on Flexible Ligand 1,5-Bis(2-ethylbenzimidazole)pentane (English)

WANG Ling, XU Shuang, MENG Wei,  
HAN Chao, YU Ji-Kang, YU Shu-Qi,  
HE Zhang-Xing, DAI Lei, HOU Hong-Wei

DOI:10.11862/CJIC.2016.219

*Chinese J. Inorg. Chem.*, **2016**,**32**:1847-1856



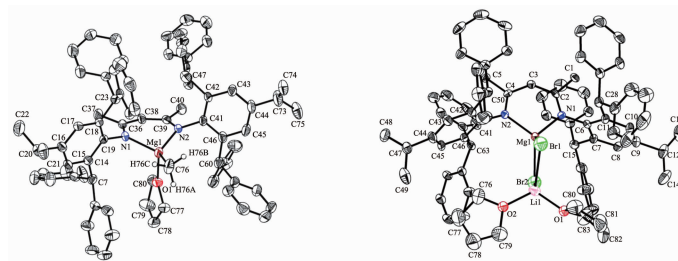
Three coordination complexes,  $[\text{Cd}(\text{bep})(\text{sba})]_n$  (**1**),  $[\text{Cd}(\text{bep})(\text{bda})]_n$  (**2**), and  $[\text{Cd}_2(\text{bep})(\text{ada})_2] \cdot \text{H}_2\text{O}]_n$  (**3**) have been prepared based on a newly designed flexible N-container ligand and different dicarboxylates. Complex **1~3** all exhibit 2D layer structures.

### Sterically Bulky $\beta$ -Diketiminato Magnesium Complexes: Syntheses, Crystal Structure and Catalytic Hydrosilylation (English)

MA Meng-Tao, SHEN Xing-Chao,  
YU Zhi-Juan, YAO Wei-Wei, DU Li-Ting,  
XU Li

DOI:10.11862/CJIC.2016.232

*Chinese J. Inorg. Chem.*, **2016**,**32**:1857-1866



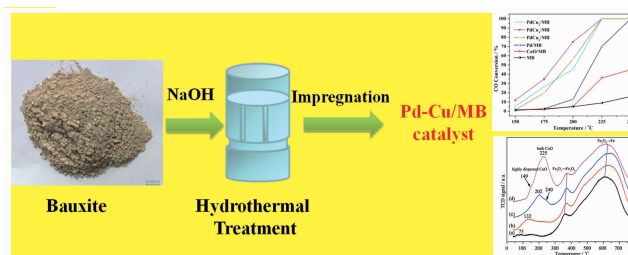
The sterically bulky  $\beta$ -diketiminato magnesium methyl and Mg-Li bimetallic magnesium bromide complexes showed moderate catalytic activity in the hydrosilylation of acetophenone.

### Effect of Cu Content on Structure and Catalytic Performance of Pd-Cu/Bauxite for CO Oxidation Reaction (English)

ZHAN Ying-Ying, XU Cong-Bo,  
CHEN Chong-Qi, LIU Xian,  
MA Yong-De, JIANG Li-Long

DOI:10.11862/CJIC.2016.248

*Chinese J. Inorg. Chem.*, **2016**,**32**:1867-1875



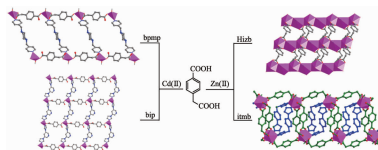
The bauxite pre-treated by NaOH solution was used as support. The physical-chemical properties and catalytic activities of the as-prepared Pd-Cu/MB catalysts for catalytic CO oxidation are modulated by the introduction of different amount of CuO.

### Zinc(II) and Cadmium(II) Coordination Polymers with Various Polynuclears Spaced by Semirigid 4-Carboxybenzoate and Nitrogen-Rich Co-ligands: Syntheses, Structures and Properties (English)

JU Feng-Yang, LI Yun-Ping, LI Gui-Lian,  
LIU Guang-Zhen, XIN Ling-Yun, LI Xiao-Ling

DOI:10.11862/CJIC.2016.234

*Chinese J. Inorg. Chem.*, **2016**,**32**:1876-1884



Four zinc and cadmium coordination polymers from 1D ladder to 2D layer have been realized by the cooperative assembly of Zn(II)/Cd(II) acetate with  $\text{H}_2\text{mba}$  and different nitrogen-rich co-ligands. And they show multifarious emission behaviors in the solid state.