

Manufacturing Technology, Electronics, Computer and Information Technology Applications

Part 5

Edited by
Zhang Lin, Hongying Hu, Yajun Zhang,
Jianguo Qiao and Jiamin Xu

Manufacturing Technology, Electronics, Computer and Information Technology Applications

PART 5

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Edited by

**Zhang Lin, Hongying Hu, Yajun Zhang,
Jianguo Qiao and Jiamin Xu**



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Preface

It is our pleasure to welcome you to the 2014 International Conference on Manufacturing Technology and Electronics Applications (ICMTEA 2014) in Taiyuan, China. ICMTEA 2014 is the first conference dedicated to issues related to Manufacturing, Mechanical Engineering, Mechatronics, Power Systems and Electronics, Measurement, Monitoring and Control, Automation, Information technology, Communication and network, Management Engineering, Materials Science, Computing Methods and Algorithms, Electric Applications. A major goal and feature of it is to bring academic scientists, engineers, industry researchers together to exchange and share their experiences and research results, and discuss the practical challenges encountered and the solutions adopted.

We hope you will have a technically rewarding experience, and use this occasion to meet old friends and make many new ones. Don't miss the opportunity to explore in Taiyuan, China. And don't forget to take a sample of the many and diverse attractions in the rest of the China.

ICMTEA 2014 promises to be both stimulating and informative with a wonderful array of keynote and invited speakers from all over the world. Delegates will have a wide range of sessions to choose from and will have a difficult decision in deciding which sessions to attend.

The program consists of invited sessions, and technical workshops and discussions with eminent speakers covering a wide range of topics in Manufacturing, Mechanical Engineering, Mechatronics, Power Systems and Electronics, Measurement, Monitoring and Control, Automation, Information technology, Communication and network, Management Engineering, Materials Science, Computing Methods and Algorithms, Electric Applications. This rich program provides all attendees with the opportunities to meet and interact with one another. We hope your experience with ICMTEA 2014 is a fruitful and long lasting one. With your support and participation, the conference will continue its success for a long time.

We would like to thank the organization staff, the members of the program committees and reviewers. They have worked very hard in reviewing papers and making valuable suggestions for the authors to improve their work. We also would like to express our gratitude to the external reviewers, for providing extra helps in the review process, and the authors for contributing their research result to the conference. Special thanks go to TTP Publisher.

We wish all attendees of the ICMTEA 2014 an enjoyable scientific gathering in Taiyuan, China. We look forward to seeing all of you next year at the conference.

Organizing Committee

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Calixarene-based Fluorescent Chemosensors for Metal Ions via Clicking

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Abstract. Calixarene-based fluorescent chemosensors, owing to its simplicity, high sensitivity and high detection limits for metal ions in biology and the environment, has been received much attention. Via clicking, calixarene derivations has the group of triazoles, which can bind to metal ions, but also can be modified by various fluorophores. This in-depth review provides an overview of calixarene-based fluorescent chemosensors for metal ions via clicking.

Introduction

Calixarene has been thoroughly investigated as the framework of many fluorescent chemosensors owing to its unique cavity and easy modification at the upper or lower rims[1]. Recently, calixarene-based fluorescent chemosensors have been good candidates for the detection of various metal ions due to its simplicity, high sensitivity and high detection limits for metal ions, especially Hg^{2+} , Cu^{2+} , Pb^{2+} , Zn^{2+} and so on[2-4]. To construct a calixarene-based fluorescent chemosensor, the modification of calixarene with an ion recognition unit (ionophore) and a fluorogenic unit (fluorophore) is important. In general, the methods of modifying fluorophore to the calixarene were by ethers[5], amide[6], esters[7], crown esters[8-9], and so on. Since the click reaction was developed, it has been widely used in the functionalization of calixarene because of its modularity, biocompatibility and efficiency.

Since the click chemistry was realized independently by Meldal and the Sharpless laboratories[10], it has gained considerable attention in the field of calixarene. The click reaction can introduce various fluorophores to the upper or lower rims of calixarene with high rate and regioselectivity. Moreover, the triazole heterocycle formed during the reaction can coordinate to metal ions, and also identify anions by hydrogen bonding[11].

Herein, we provide an overview of calixarene-based fluorescent chemosensors for metal ions via clicking. The emphasis here is on the sensing of metal ions. And the triazole groups play a crucial role in the sensing of metal ions.

Calixarene-based fluorescent chemosensors for Ag^+ ion

The heavy metal ions in the bodies of humans and animals can lead to serious illnesses even in low concentration. In the past few years, the fluorescent chemosensors for the selective and sensitive detection of heavy ions have attracted much attention. For example, Ag^+ ions accumulation in the body will influence the activity of enzyme and combine with various metabolites[12]. Yamato and the co-workers designed and synthesized a new fluorescent 1,3-alternate triazole-based thiacalixarene 1 with pyrenyl[13]. From the fluorescent spectra, 1 were highly selective for Ag^+ over other metal ions by enhancing the monomer emission of pyrene in neutral solution. However, other heavy metal ions, such as Cu^{2+} and Hg^{2+} quench both the monomer and excimer emission of pyrene acutely. The ^1H NMR results also indicated that Ag^+ can be selectively recognized by the triazole moieties on the 1 together with the ionophoric cavity formed by the two inverted benzene rings and sulfur atoms of the thiacalixarene 1 as shown in the Fig. 1.

Wen-Sheng Chung and the groups designed and prepared a novel 1,3-alternate calixarene 2, which contained two different cationic binding sites of bis-triazoles and bis-enaminone groups[14]. In the presence of most competing metal ion, 2 retained its selectivity toward Ag^+ ion. The fluorescence intensity of 2 was selectively enhanced by binding with Ag^+ ions in methanol/chloroform (49:1, v/v) cosolvent. Besides, based on ^1H NMR titration results, it was inferred that the two distal bis-enaminone and bis-triazole groups on 2 cooperatively coordinated to Ag^+ ions with the help of