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The Chinese University of Hong Kong
Department of Chemistry
Research Seminar Series

Speaker: Prof. Cheuk-Wai So
Division of Chemistry and Biological Chemistry
Nanyang Technological University

Title: Chemistry of Low-Valent Group 14 Element Complexes

<< Abstract >>

Recently, a series of novel base-stabilized group 14 element(I) dimers [RË-ËR] (E = Si, Ge, Sn, R = amidinate, guanidinate, β-diketiminate, N-functionalized aryl, P-functionalized amide etc.) was synthesized.[1] They are considered as base-stabilized heavier alkyne analogues. Their reactivities showed that they are powerful reagents for the activation of small molecules, unsaturated substrates etc. My research team demonstrated that base-stabilized group 14 element(I) dimers can serve as synthons for the preparation of group 14 elements-containing aromatic/delocalized π-conjugated systems. Firstly, the first 2,6-diiminophenyl-stabilized germanium(I), tin(I) and lead(I) dimers $[\{2,6\text{-}(CH{=}NAr)_2C_6H_3\}E{:}]_2$ (E = Ge, Sn, Pb; Ar = 2,6-*i*$Pr_2C_6H_3$) can be reduced by alkali metal to form novel aromatic low valent group 14 analogue of indenyl anions $[\{2,6\text{-}(CH{=}NAr)_2C_6H_3\}E{:}]^-$.[2] Secondly, the reaction of three equivalents of the amidinate-stabilized silicon(I) dimer $[PhC(N\textit{t}Bu)_2Si{:}]_2$ with two equivalents of ArN=C=NAr afforded the singlet delocalized 2,4-diimino-1,3-disilacyclobutanediyl $[LSi(\mu\text{-}CNAr)_2SiL]$ (L = $PhC(N\textit{t}Bu)_2$).[2] Moreover, the reaction of $[PhC(N\textit{t}Bu)_2Si{:}]_2$ with two equivalents of the amido trichlorosilane [L'$SiCl_3$] (L' = 2,6-*i*$Pr_2C_6H_3NSiMe_3$) and six equivalents of KC_8 afforded the extensive *n*, *π*, *σ*-electron delocalized Si_4 ring $[LSi(\mu\text{-}SiL')_2SiL]$.[3] Thirdly, the incorporation of heavier group 14 elements into cyclobutadiene can be achieved from the reactivity of amidinate-stabilized heavier group 14 element(I) dimers.[4] Moreover, my research team showed that the N-heterocyclic silylene can stabilize a germanium atom in the zero oxidation state.[5] Finally, we illustrate the first example of B-H bond activation of borane and CO_2 activation by stable carbenoid species.[6]

References

1. Selected recent articles: a) C. Jones, S. J. Bonyhady, N. Holzmann, G. Frenking, A. Stasch, *Inorg. Chem.* **2011**, *50*, 12315; b) S. Khan, R. Michel, J. M. Dieterich, R. A. Mata, H. W. Roesky, J.-P. Demers, A. Lange, D. Stalke, *J. Am. Chem. Soc.* **2011**, *133*, 17889; c) D. Gau, R. Rodriguez, T. Kato, N. Saffon-Merceron, A. de Cózar, F. P. Cossío, A. Baceiredo, *Angew. Chem. Int. Ed.* **2011**, *50*, 1092.
2. a) S.-P. Chia, R. Ganguly, Y. Li, C.-W. So, *Organometallics* **2012**, *31*, 6415; b) S.-P. Chia, H.-X. Yeong, C.-W. So, *Inorg. Chem.* **2012**, *51*, 1002; c) S.-P. Chia, H.-W. Xi, Y. Li, K. H. Lim, C.–W. So, *Angew. Chem. Int. Ed.* **2013**, *52*, 6298.
3. S.-H. Zhang, H.-W. Xi, K. H. Lim, C.-W. So, *Angew. Chem. Int. Ed.* **2013**, *52*, 12346.
4. H.-X. Yeong, H.-W. Xi, Y. Li, S. B. Kunnappilly, B. Chen, K.-C. Lau, H. Hirao, C.-W. So**,** *Chem. Eur. J.* **2013**, *19*, 14726.
5. Y.-L. Shan, W.-L. Yim, C.-W. So, *Angew. Chem., Int. Ed. DOI:* 10.1002/anie.201408347.
6. H. Heuclin, S. Y.-F. Ho, X. F. Le Goff, C.-W. So, N. Mézailles, ***J. Am. Chem. Soc.* 2013, *135*, 8774.**

Date: January 6, 2015 (Tuesday)

Time: 4:30 p.m.

Venue: L4, Science Centre

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Contact Person:
Prof. Kevin W.P. Leung

For favour of posting

The Chinese University of Hong Kong
Department of Chemistry
Research Seminar Series

Speaker: Prof. Manfred Schmidt
Institute für Physikalische Chemie
Johannes Gutenberg-Universität Mainz
Germany

Title: Multifunctional Cylindrical Brushes for Application in Tumor Immune Therapy

Date: January 12, 2015 (Monday)

Time: 2:30 p.m.

Venue: Room G36
Lady Shaw Building

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Contact Person:
Prof. Chi Wu

For favour of posting

The Chinese University of Hong Kong
Department of Chemistry
Research Seminar Series

Speaker: Prof. Eamor Woo
Department of Chemical Engineering
National Cheng Kung University
Taiwan

Title: Novel Approaches on Crystal bending and Twisting Assembly in Polymer Spherulite Growth

Date: January 16, 2015 (Friday)

Time: 2:30 p.m.

Venue: Room 715
Mong Man Wai Building

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Contact Person:
Prof. Chi Wu

For favour of posting

The Chinese University of Hong Kong
Department of Chemistry
Research Seminar Series

Speaker: Prof. Xuan Mu
School of Basic Medicine
Peking Union Medical College

Title: Microfluidic paper-based diagnostic device

<< *Abstract* >>

Microfluidic paper-based analytical devices or µPAD is made of paper, a thin and porous membrane. Compared with glass and PDMS, paper has superior and unique characteristics, such as capillary force, fibrous nature and low-cost, and thus has been employed in analytical fields for a very long time. However, by taking advantage of vertically stacking as well as patterning, µPAD shows a new level of analytical and diagnostic functions. We strived to seek new technologies for fabricating µPAD as well as to address emergent and important medical issues. In our recent work, µPAD shows unprecedented capability to significantly innovate on the diagnosis of Cystic Fibrosis, a most common inherited disease and Hepatitis C Virus, the leading cause of liver cirrhosis and cancer. Despite of some unmet needs, µPAD would be greatly promising in clinical diagnosis, especially for boosting new Point-of-Care medical devices.

Date: January 20, 2015 (Tuesday)

Time: 10:30 a.m.

Venue: Room G34, Lady Shaw Building

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Contact Person:
Prof. Bo Zheng

For favour of posting

The Chinese University of Hong Kong
Department of Chemistry
Research Seminar Series

Speaker: Prof. Gang Zhao
Shanghai Institute of Organic Chemistry
Chinese Academy of Sceinces

Title: Design, Synthesis and Application of Organo-catalysts Based on Amino Acids

Date: January 22, 2015 (Thursday)

Time: 2:00 p.m.

Venue: Room 158
Science Centre

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Contact Person:
Prof. Zuowei Xie

For favour of posting

The Chinese University of Hong Kong
Department of Chemistry
Research Seminar Series

Speaker: Prof. Atsushi Takahara
Institute for Materials Chemistry and Engineering
Kyushu University

Title: Precise Design of Antifouling, Lubrication and Intelligent Adhesion Surfaces through Polyelectrolyte Brush Immobilization

<< *Abstract* >>

Surfaces and interfaces of soft materials play an important role in various functional applications. Polyelectrolyte brushes provide soft interfaces with unique functionality. However, systematic studies on the structure and functionality of polyelectrolyte brushes at liquid interfaces have not been done yet. Various polyelectrolyte brushes with anionic, cationic, and zwitter ionic side chains were prepared on initiator immobilized Si-wafer and macroinitiator-modified polypropylene by surface-initiated atom transfer radical polymerization (SI-ATRP). Surface wettability and chain conformation of polymer brushes at water/solid interfaces were characterized by contact angle measurement and neutron reflectivity, respectively. Super hydrophilic surfaces, antifouling surfaces, environmentally friendly water lubrication systems, and repeatable environmentally friendly adhesion systems without organic solvents were realized through polyelectrolyte brushes immobilization.

Date: January 22, 2015 (Thursday)

Time: 4:30 p.m.

Venue: Room LG23, Science Centre

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Contact Person:
Prof. Chi Wu

For favour of posting

The Chinese University of Hong Kong
Department of Chemistry
Research Seminar Series

Speaker: Prof. Atsushi Takahara
Institute for Materials Chemistry and Engineering
Kyushu University

Title: Design and Characterization of Novel Nanohybrids from Natural Inorganic Nanotubes

Date: January 23, 2015 (Friday)

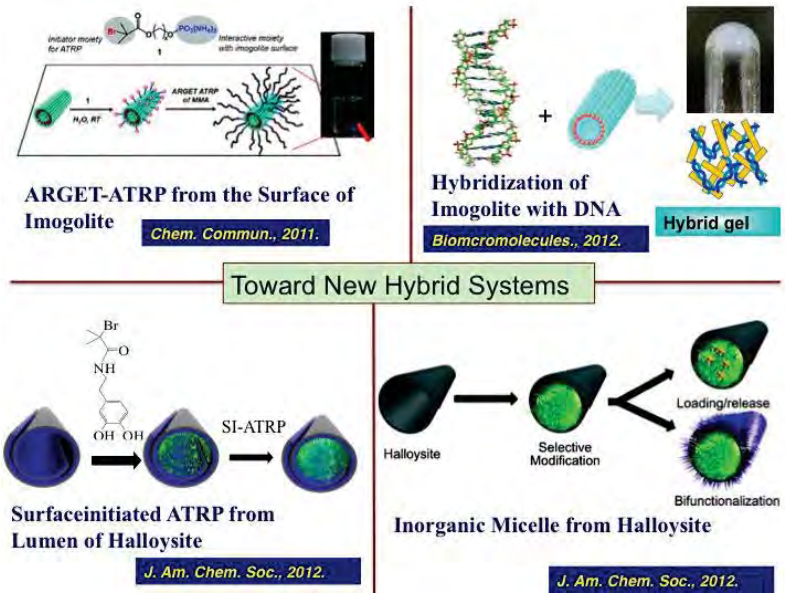
Time: 4:30 p.m.

Venue: L1, Science Centre

<< Abstract >>

Imogolite and halloysite are naturally occurring aluminosilicate nanotube. Imogolite consists of a single-wall nanotube with a composition of $(OH)_3Al_2O_3SiOH$ with Al-OH and Si-OH groups distributed on the external and internal surfaces of the tube wall, respectively. In contrast, halloysite has a composition of $Al_2Si_2O_5(OH)_4.nH_2O$ and renders a multi-wall structure of rolling clay layers with Al-OH groups on the face the lumen. In this presentation, we report the recent progress in surface functionalization of imogolite and halloysite and the preparation of novel polymer nanohybrids.

Several approaches for dispersing imogolite into polymer matrices, including both of the hydrophobic and the hydrophilic polymers, were achieved[1]. Also, imogolite was applied hydrogel formation of biomacromolecules. Selective modification of halloysite nanotube's inner surface was demonstrated[2]. Aqueous phosphonic acid was bind to alumina sites at the tube lumen and formed hydrophobic lumen. Surface-initiated atom transfer radical polymerization (SI-ATRP) was performed through the selectively adsorbed DOPA-functionalized ATRP-initiator to prepare polymer brushes on the nanotube lumen]3]. Also, surface modified halloysite was applied for preparation of stable liquid marbles[4].



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[1] W. Ma, W.-O. Yah, H. Otsuka, A. Takahara, J. Mater. Chem., 22, 11887-11892(2012).
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[3] W. O. Yah, H. Xu, H. Soejima, W. Ma, Y. Lvov, A. Takahara, J. Am. Chem. Soc., 134, 12134-12137(2012).
[4] H. Wu, H. Watanabe, W. Ma, A. Fujimoto, T. Higuchi, K. Uesugi, A. Takeuchi, Y. Suzuki, H. Jinnai, A. Takahara, Langmuir, 29, 14971-14975(2013).

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Contact Person:
Prof. Chi Wu

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The Chinese University of Hong Kong
Department of Chemistry
Research Seminar Series

Speaker: Prof. Zhen Shen
State Key Laboratory of Coordination Chemistry
School of Chemistry and Chemical Engineering
Nanjing University

Title: Core-Modified Porphyrins Containing Novel Heterocyclic Moieties

Date: January 30, 2015 (Friday)

Time: 4:30 p.m.

Venue: L1
Science Centre

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Contact Person:
Prof. K.S. Chan