

河口生态安全与环境健康

福建省高校重点实验室（厦门大学嘉庚学院）

2017年度讲学报告（第二期）

ANNUAL PROGRESS REPORT

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Exchange and Cooperation

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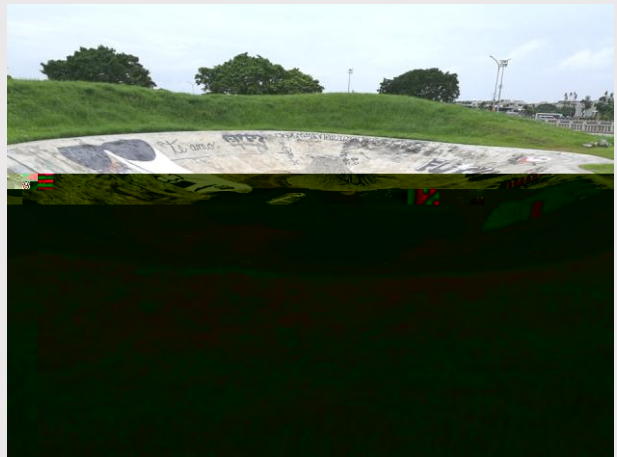
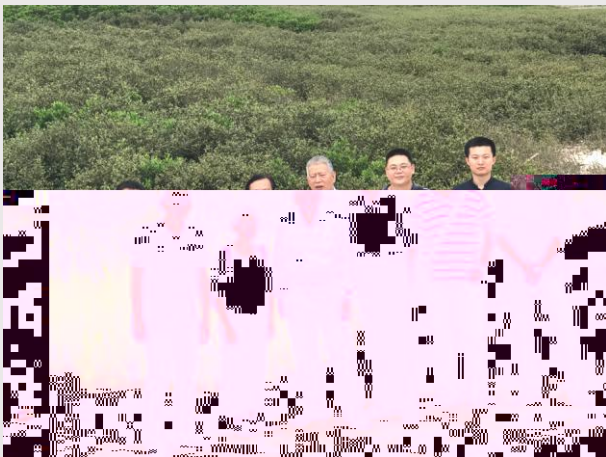
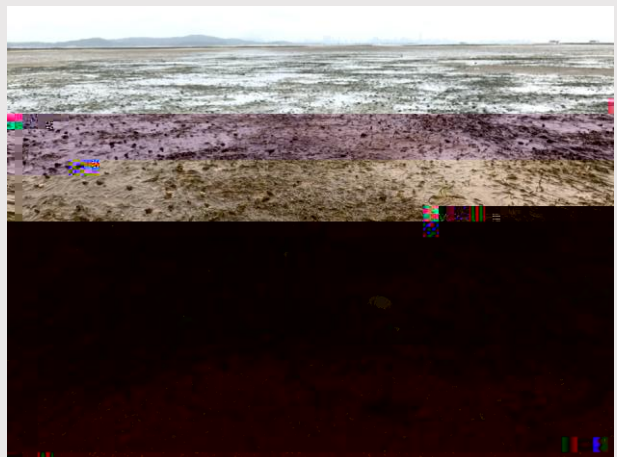
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Public Opening

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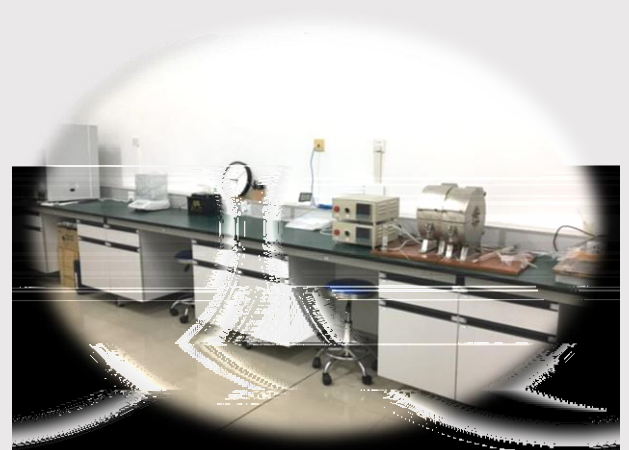
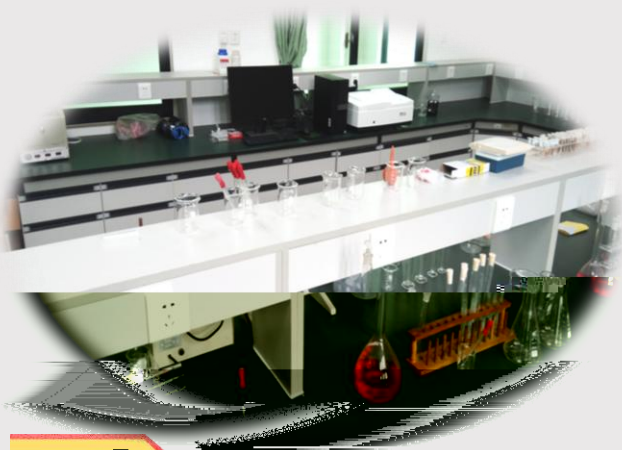


Lab Construction

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Research Progress

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Interaction of chromium (III) or chromium (VI) with catalase and its effect on the structure and function of catalase: an in vitro study		Food Chemistry	2017-10-12
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Comparison of antioxidant activity of exopolysaccharides between lactobacillus acidophilus la and bifidobacterium adolescentis ba in vitro		International Conference	2017-05-20
Fabrication of polymeric ionic liquid-modified magnetic adsorbent for extraction of apolar and polar pollutants in complicated samples		Talanta	2017-05-11
Dynamics and production of dissolved organic carbon in a large continental shelf system under the influence of both river plume and coastal upwelling		Limnology & Oceanography	2017-05-01
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Variations in the isotopic composition of stable mercury isotopes in typical mangrove plants of the Jiulong estuary, SE China		Environmental Science & Pollution Research	2017-01-25
Fractionation of mercury stable isotopes during coal combustion and seawater flue gas desulfurization		Applied Geochemistry	2017-01-05
NaCl			2017-01-01

Interaction of chromium(III) or chromium(VI) with catalase and its effect on the structure and function of catalase: An in vitro study

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Abstract: Heavy metal chromium (Cr) poses a severe health risk to humans *via* food chain contamination. In this study, the interactions of either trivalent chromium (Cr(III)) or hexavalent chromium (Cr(VI)) with catalase (CAT) were investigated *via* multi-spectroscopic studies and computational simulations. The fluorescence analysis showed that Cr(III) and Cr(VI) quenched the fluorescence of CAT through a dynamic and a static quenching mechanism, respectively. The binding constant of Cr(VI) with CAT was $3.44 \times 10^4 \text{ l mol}^{-1}$ at 298 K. Other detailed binding characterizations of the Cr(VI)-CAT complex were also obtained using spectra analysis and molecular docking. Synchronous fluorescence, UV-vis and circular dichroism (CD) spectral studies showed that either Cr(III) or Cr(VI) induced conformational changes of CAT, but the degree of influence was different. The response of CAT activity to Cr(III) or Cr(VI) was found to be variable depending on their valence states and concentrations.

Key words: Chromium; Catalase; Interaction mechanism; Spectroscopic methods; Molecular docking

Fabrication of polymeric ionic liquid-modified magnetic adsorbent for extraction of apolar and polar pollutants in complicated samples

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b. Department of Environmental Science & Engineering, Tan KahKee College, Zhangzhou 363105, China)

Abstract: A new polymeric ionic liquid-modified magnetic adsorbent (PIL-MA) was successfully fabricated and used to extract apolar and polar pollutants with magnetic solid-phase extraction (MSPE). The PIL-MA was prepared by simple free radical copolymerization of 1-vinylbenzyl-3-methylimidazolium hexafluorophosphate, divinylbenzene and silica-coated magnetite. Several characterized techniques including infrared spectroscopy, elemental analysis, scanning electron microscopy, transmission electron microscopy and magnetic measurement were used to characterize the PIL-MA. Parabens and aromatic amines were selected as test analytes to investigate the extraction performance of PIL-MA for apolar and strongly polar analytes, respectively. The extraction parameters including the amount of PIL-MA, adsorption time, desorption solvent and time, pH value and ionic strength were optimized thoroughly. At the same time, convenient and sensitive analytical methods for parabens and aromatic amines in real samples were developed by the combination of PIL-MA-MSPE and HPLC-DAD. Results well demonstrate that there are abundant active groups in the PIL-MA and multiply interactions including π - π , hydrophobic, hydrogen-bonding and dipole-dipole are involved in the extraction..

Keywords: Polymeric ionic liquid; Adsorbent; Magnetic solid-phase extraction; Parabens; Aromatic amines

Dynamics and production of dissolved organic carbon in a large continental shelf system under the influence of both river plume and coastal upwelling

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b. Department of Environmental Science and Engineering, Xiamen University Tan KahKee College, Zhangzhou, China)

Abstract: We examined the dynamics and production of dissolved organic carbon (DOC) on a large continental shelf in the northern South China Sea, which is largely shaped by a river plume and coastal upwelling, based on a cruise in summer 2008. The plume water extended from the mouth of the Pearl River estuary to the middle shelf and was characterized by high DOC concentrations, while the upwelled water occupying the near shore area featured low DOC concentrations. Biological production of DOC was observed in both the river plume and the coastal upwelling zones with different behavior between regions. The system appeared to be autotrophic in terms of DOC throughout the plume, while in the upwelling circulation, the metabolism of DOC was mixed trophic. Nevertheless, the integrated net DOC production rate of $11.5 \pm 6.9 \text{ mmol C m}^{-2} \text{ d}^{-1}$ in the upwelling zone was comparable to that in the plume ($7.1 \pm 7.0 \text{ mmol C m}^{-2} \text{ d}^{-1}$). The net DOC production correlated strongly with net consumption of dissolved inorganic carbon (DIC) and inorganic nutrients, suggesting that the net DOC production was highly coupled to net community production (NCP) in both the plume and upwelling zones. Both regimes had similar DOC/NCP partitioning, with 19–27% of NCP in the plume and 24–26% of NCP in the upwelling zones converted to DOC. A positive correlation was also found between particulate organic carbon (POC) and net DIC consumption, with higher POC production in the upwelling zones where large phytoplankton prevailed. Most NCP removal occurred through POC sinking and/or the diffusion and horizontal transport of DOC.

A novel AQDS–rGO composite to enhance the bioreduction of As(V)/Fe(III) from the flooded arsenic-rich soil

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Sanming, P. R. China)

Abstract: Anthraquinone-2,6-disulphonate (AQDS) and reduced Graphene Oxide (rGO) were selected to prepare the AQDS–rGO composites for investigating the bioreduction performance of As(V)/Fe(III) from the flooded arsenic-rich soil. The addition of AQDS–rGO composites coupled with acetate helped release more $849.87 \pm 97.05 \text{ } \mu\text{g L}^{-1}$ of As(III) and $144.02 \pm 10.02 \text{ mg L}^{-1}$ of Fe(II) from soil, compared to acetate control at $208.17 \pm 35.97 \text{ } \mu\text{g L}^{-1}$ of As(III) and $85.75 \pm 4.80 \text{ mg L}^{-1}$ of Fe(II). Meanwhile, the performance was also perceived to be better than the amendments with the mixture of gradient AQDS and acetate, as well as the incorporation of gradient AQDS, rGO and acetate (identified by the maximal levels of Fe(II) and As(III), less than $130.74 \pm 22.01 \text{ mg L}^{-1}$ and $675.15 \pm 67.06 \text{ } \mu\text{g L}^{-1}$, respectively). Because metal-reducing or metal-oxidizing bacteria in the soil are susceptible to the soluble AQDS level, it would in turn influence the bioreduction performance of As(V)/Fe(III). The mediated strategies of AQDS-composites positively correlated with the loaded contents of AQDS, electrical conductivity and increasing abundance of metal-reducing bacteria (e.g., *Desulfitobacterium*, *Clostridium*, *Pseudomonas*, *Geobacter*, and *Anaeromyxobacter*) derived from the AQDS–rGO composites amendments, favor the bioreductive dissolution of As(V)/Fe(III) from the soil. This insight will encourage the application of a promising tool as an alternative technology for remediating arsenic-polluted soil.

Fractionation of mercury stable isotopes during coal combustion and seawater flue gas desulfurization

Shuyuan Huang, Dongxing Yuan, Haiying Lin, Lumin Sun; Shanshan Lin

Abstract: In the current study, fractionation of mercury isotopes during coal combustion and seawater flue gas desulfurization (SFGD) in a coal-fired power plant using a SFGD system was investigated. Fourteen samples were collected from the power plant. The samples were pretreated with a combustion-trapping method and were analyzed with a multi-collector inductively coupled plasma mass spectrometer (MC-ICP-MS). Compared with the raw coal, the bottom ash was enriched with lighter mercury isotopes with ^{202}Hg values ranging from 610.45 to 610.03‰. The fly ash was enriched with lighter mercury isotopes with ^{202}Hg values ranging from 611.49 to 610.73‰ for Chinese coal and from 611.47 to 610.62‰ for Indonesian coal. The ^{202}Hg of fresh seawater and desulfurized seawater was found to be 611.32 and 610.32‰ respectively. These ^{202}Hg values indicated that the desulfurized seawater was enriched with heavier mercury isotopes. Based upon the calculated results obtained from the mass balance equation, it was suggested that the stack emissions were enriched with lighter mercury isotopes. Mass independent fractionation was observed in most of the samples with a $^{199}\text{Hg}/^{201}\text{Hg}$ ratio of approximately 0.96. The results help in improving the understanding of mercury isotope fractionation during coal combustion and SFGD, and are also useful in tracing the mercury emissions from coal fired power plants.

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dissolved organic carbon DOC

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		3				361102		
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ind/(10 cm ²)			(555.8±104.6) μg/(10 cm ²)				(two-way ANOVA)	
			(J)	(H)	()			Pearson
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		1.					363105	
		2.					363105	
		<i>Vicia faba</i>						SJ CY
		1.5 4.5 6.0 9.0 12.0 15.0 g L ⁻¹						
								SJ
CY		9.0 6.0 g L ⁻¹						

1 2 1 2 1

1 361002 2 363105

3 *Garcinia celebica L.* 15 72 h 3 6 9

36 h SOD POD

6~9 6 a b 3

SOD POD 6~9 SOD POD 6~9

1,2,3 4 5 2

1 363105 2 430074

3 363105

4 361021 5 430074

ELF-MF

ELF-MF

NaCl

1 2 3 3 3

(1 361102

2 363105

3

NaCl NaCl

0.4% 0.8% 1.2% NaCl 3

MDA NaCl

0.8%NaCl SOD

0.8%NaCl 0.455%

NaCl

Innovation and Entrepreneurship

2017 2 3
2017 1 1 + 2 1
2017 12 20%

3
2017

2017

2017 7 16



2017 7 17



2017 7 20

2017 7 21



NGO

2017 8 15

NGO

4



10

SEE

2017 9 23



APP



2015

SEE

Talent cultivation

2014

16



2014

4

2017 6



2017

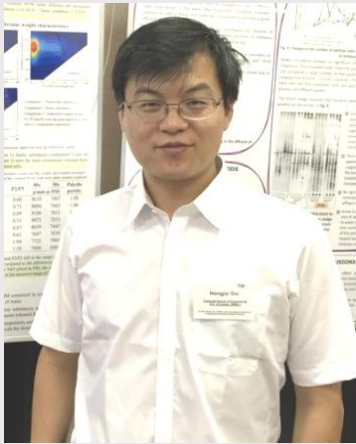


2014



2017

New Members



2010.9-2013.6

2013.10-2014.3

2014.4-2017.3

2017.8-

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2007.09-2010.07

2013.09-2017.06

2017.8-

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