

研究论文

表层沉积物(生物膜)非残渣态组分的选择性萃取分离及其吸附铜/锌的特性

李鱼<sup>1,2</sup>, 王晓丽<sup>2</sup>, 张正<sup>2</sup>, 郭书海<sup>3</sup>

1. 华北电力大学能源与环境研究中心, 北京 102206;
2. 吉林大学环境与资源学院, 长春 130012;
3. 中国科学院沈阳应用生态研究所, 沈阳 110016

收稿日期 2006-5-24 修回日期 网络版发布日期 2006-12-1 接受日期

**摘要** 采用化学萃取技术对表层沉积物(生物膜)的非残渣态组分(铁、锰氧化物及有机质)进行了分离, 并研究了表层沉积物(生物膜)非残渣态和残渣态组分吸附铜、锌的特性. 结果表明, 0.1 mol/L  $\text{NH}_2\text{OH}\cdot\text{HCl}+0.1 \text{ mol/L HNO}_3$ ,  $(\text{NH}_4)_2\text{C}_2\text{O}_4\text{-H}_2\text{C}_2\text{O}_4$  缓冲溶液和体积分数为30%的 $\text{H}_2\text{O}_2$ 可选择性地萃取分离表层沉积物(生物膜)非残渣态的锰氧化物、铁锰氧化物和有机质, 萃取率为63.15%~97.59%, 同时对非目的组分影响较小; 表层沉积物(生物膜)及其各组分对铜的吸附能力均大于对锌的吸附能力, 且生物膜及其各组分对铜、锌的吸附能力均高于表层沉积物及其相应组分对铜、锌的吸附能力; 表层沉积物(生物膜)非残渣态组分对铜、锌的吸附能力均大于残渣态组分, 且非残渣态组分中锰氧化物的单位吸附能力最强, 其次是铁氧化物, 而有机质的单位吸附能力较弱, 比锰氧化物低2个数量级, 说明生物膜对水体中痕量重金属的迁移转化作用强于表层沉积物, 而表层沉积物(生物膜)中金属(铁、锰)氧化物对水中痕量重金属起主要控制作用.

**关键词** [表层沉积物](#) [生物膜](#) [非残渣态](#) [选择性萃取](#) [重金属](#) [吸附](#)

分类号 [X131.3](#) [X132](#)

**DOI:**

Selective Extraction and Separation of Non-residual Components in the Surficial Sediments(Surface Coatings) and Adsorption Characteristics of Cu and Zn

LI Yu<sup>1,2</sup>, WANG Xiao-Li<sup>2</sup>, ZHANG Zheng<sup>2</sup>, GUO Shu-Hai<sup>3</sup>

1. Energy and Environmental Research Center, North China Electric Power University, Beijing 102206, China;
2. College of Environment and Resources, Jilin University, Changchun 130012, China;
3. Institute of Applied Ecology, Chinese Academy of Sciences, Shenyang 110016, China

Received 2006-5-24 Revised Online 2006-12-1 Accepted

**Abstract** The selective separation of non-residual components of surficial sediments(surface coatings) was performed via chemical extraction techniques and then Cu and Zn adsorption to the non-residual components and residual component of surficial sediments(surface coatings) were investigated. The results indicate that 0.1 mol/L  $\text{NH}_2\text{OH}\cdot\text{HCl}+0.1 \text{ mol/L HNO}_3$ ,  $(\text{NH}_4)_2\text{C}_2\text{O}_4\text{-H}_2\text{C}_2\text{O}_4$  buffer solution and 30%  $\text{H}_2\text{O}_2$  could remove Mn oxides, Fe/Mn oxides and organic materials from the non-residual components of surficial sediments(surface coatings) with the efficiency ranging from 63.15% to 97.59%, and the effects of extraction on non-target components were negligible. Cu adsorption to the surficial sediments(surface coatings) and the individual component of surficial sediments(surface coatings) were much greater than those of Zn, and the adsorption capability of surficial sediments was much smaller than that of surface coatings. Furthermore, Cu and Zn adsorption to the non-residual components of surficial sediments(surface coatings) were much greater than those to residual component, and that the greatest contribution to metals adsorption on a molar basis was from Mn oxides in the non-residual component. Metals adsorption capacities of Mn oxides exceeded those of organic materials by two orders of magnitude, and the estimated contribution of the residual component to metals adsorption was insignificant. These results imply that the role of surface coatings in transformation and cycling of heavy metals in aquatic environments was more important than that of surficial sediments, and the relative importance for controlling heavy metals in aquatic environments was attributed to metal(Fe and Mn) oxides.

**Key words** [Surficial sediment](#); [Surface coating](#); [Non-residual fraction](#); [Selective extraction](#); [Heavymetal](#); [Adsorption](#)

扩展功能

本文信息

▶ [Supporting info](#)

▶ [PDF\(382KB\)](#)

▶ [\[HTML全文\]\(0KB\)](#)

▶ [参考文献](#)

服务与反馈

▶ [把本文推荐给朋友](#)

▶ [加入我的书架](#)

▶ [加入引用管理器](#)

▶ [引用本文](#)

▶ [Email Alert](#)

▶ [文章反馈](#)

▶ [浏览反馈信息](#)

相关信息

▶ [本刊中 包含“表层沉积物”的 相关文章](#)

▶ 本文作者相关文章

· [李鱼](#)

·

· [王晓丽](#)

· [张正](#)

· [郭书海](#)

---

通讯作者:

李鱼 [李鱼liyuxx8@hotmail.com](mailto:李鱼liyuxx8@hotmail.com)

作者个人主页: 李鱼<sup>1;2</sup>; 王晓丽<sup>2</sup>; 张正<sup>2</sup>; 郭书海<sup>3</sup>