CARBON BASED MATERIALS FOR CADMIUM AND ZINC REMEDIATION OF CONTAMINATED WATER

Yihan Zhao[1] and M Anne Naeth[1]

BACKGROUND

The Problem

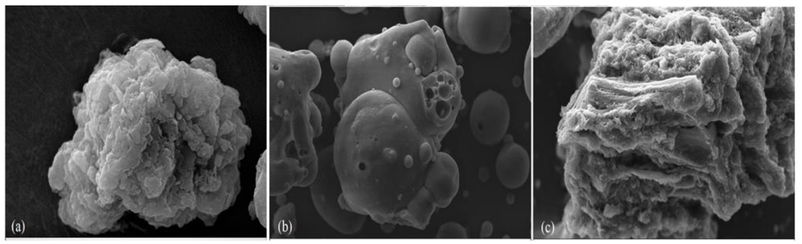
- Heavy metals are toxic at low concentrations
- Contamination in water is a priority concern for the environment and public health
- Conventional methods are expensive, time consuming and low efficiency

Research Objectives

- Investigate adsorption effectiveness of Cd(II) and Zn(II) removal from contaminated water
- Understand adsorption mechanisms for metal remediation

New Technology

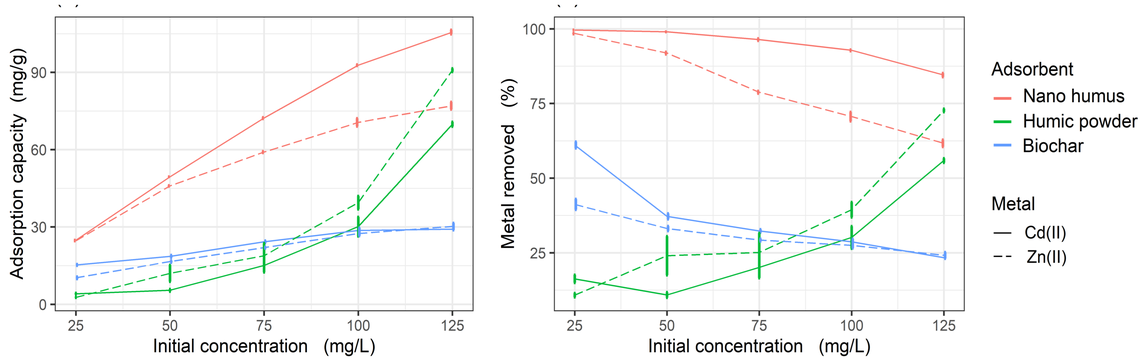
- Low cost porous carbon based materials
- Sourced from agricultural and industrial waste



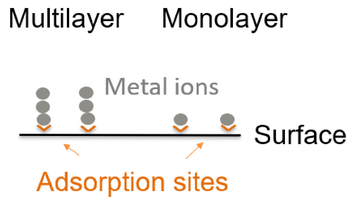
Nano humus (lignite wastes) | Humic powder | Biochar (cattle manure)

RESULTS

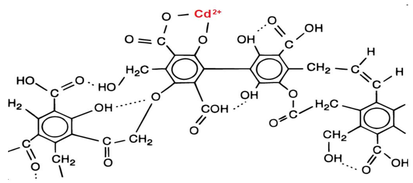
- Materials could bond multiple layers of metal molecules on their surface
- Metal ion initial concentration greatly influenced adsorption
- Nano humus and biochar had higher affinity for Cd(II) than Zn(II)
- Humic powder had higher affinity for Zn(II) than Cd(II)



Effect of initial concentration



Adsorption mechanism



Structure of nano humus

CONCLUSIONS

Summary

- Nano humus was most effective adsorbent, followed by biochar and humic powder
- Both nano humus and biochar were recommended for metal remediation from contaminated water

Research Benefits

- Low cost, efficient, rapid adsorbents
- Reduce remediation costs
- Reduce remediation time
- New remediation alternatives
- Global implications, widely applicable throughout the world

PARTNERS

- Future Energy Systems, Canada First Research Excellence Fund
- Tsinghua University, China
- Shendong Coal Mine, China Shenhua Energy
- Land Reclamation International Graduate School (LRIGS)

UNIVERSITY OF ALBERTA
FUTURE ENERGY SYSTEMS

[1]Department of Renewable Resources, University of Alberta, Edmonton, Alberta