



In Conjunction with the American Chemical Society
Student Affiliates at the University of Pittsburgh



Volume 30, Issue 4

January 18, 2021

CHEM MAJOR NEWS

Welcome Back!

Hello all,

Welcome back to Pitt! We hope you had a great fall semester and a relaxing winter break. We are excited to have you back this spring. Looking ahead, we are planning to hold three virtual meetings for the ACS - one in January, February, and March. Along with that, we are also planning to hold a virtual Saturday Science for this semester. We hope you all have a strong start to this spring term and wish you all the best as we start classes!

Christopher Manko
ACS Newsletter Co-Editor



Spring Term 2021 Schedule

We hope to hold a Zoom Meeting each month during the Spring Term. More details will follow.

2020-2021 ACS-SA Officers and Staff

Noah Bright-Co-President

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Logan Newman-Outreach Coordinator

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Michael Kane-Green Chemistry

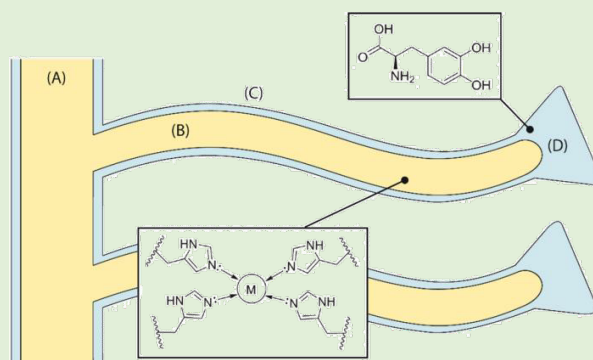
Ari Freedman-Technical Wizard

Visit us at <http://www.chem.pitt.edu/acs-sa/>

Pumping Iron with Mussels

By Michael Kane, Green Chemistry Contributor

I'm sure we've all struggled through electrochemistry, learning about metal ions being used in batteries, and the many other ways that metal ions are being used in technology today. However, sometimes we fail to consider what happens to those metal ions after they have run their course. Some of these metal ions such as iron, cobalt, nickel, copper, and others can be introduced into the environment as pollutants. These ions are concerning as a result of their carcinogenicity, bio-accumulation tendency, and persistence in nature.^[1] For this reason, researchers have extensively studied new ways to pull metal ions out of the environment in a cost-efficient, safe, and effective way. Previous methods of metal ion removal include adsorption, complexing, solvent extraction, and many more. While these methods can be effective, limitations such as adverse by-products, high cost, and low efficiency have driven researchers to continue the search for better metal ion removal techniques. Now I'm sure you're on the edge of your seat



Schematic of byssus. (A)- Stem (B)- thread core (C)- the cuticle (D)- the plaque ^[1]

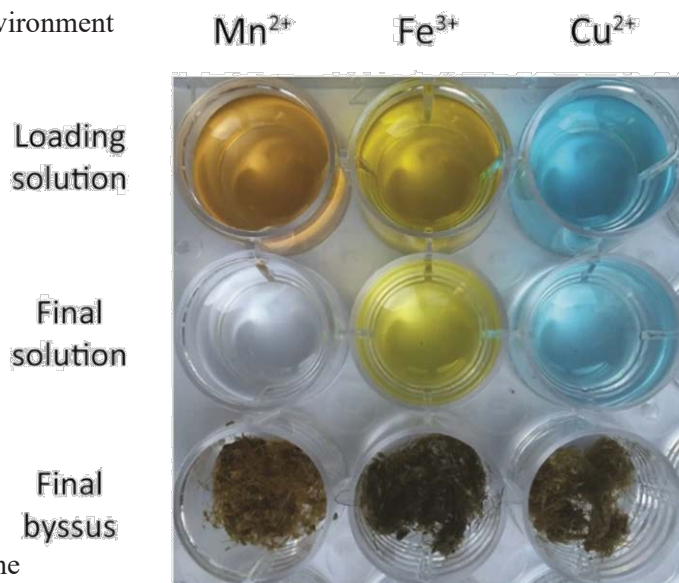
“Byssus has been identified as a promising pollutant metal ion remover due to its great amount of naturally occurring metal binding sites found throughout the structure.”

an attempt to anchor themselves against the flowing current, have been known to create a dense, fibrous threadlike structure called byssus. Byssus has been identified as a promising pollutant metal ion remover due to its great amount of naturally occurring metal binding sites found throughout the structure. The thread core and stem of byssus is rich in terminal histidine domains, allowing these portions to bind metals like zinc and copper (represented as M above). The complex molecule

coming from (D) is dihydroxyphenylalanine (or DOPA, because nobody has time to write that out more than once). Without getting into unnecessary specifics, we will just take it at face value that it binds iron. Along with this promising ability to bind metals, byssus is readily available as waste from mussel industries worldwide, reducing the cost limitation of metal removers. With this knowledge, researchers went on to test the metal binding ability of byssus using metals that are known to bind with byssus (iron, zinc, and copper) as well as other metals known to cause significant damage to the environment (cadmium, cobalt, nickel, manganese, and vanadium).

Using ICP-OES to determine metal concentrations after the metal ion uptake by the byssus, each metal was tested individually for its affinity to the byssus. Although this simple approach allowed a greater understanding of how byssus uptakes metal ions, this does not paint an accurate picture of an environmental sample, which contains many different metal ions. Regardless of this limitation, the researchers were able to conclude that byssus was able to efficiently remove metal ions such as manganese, iron,

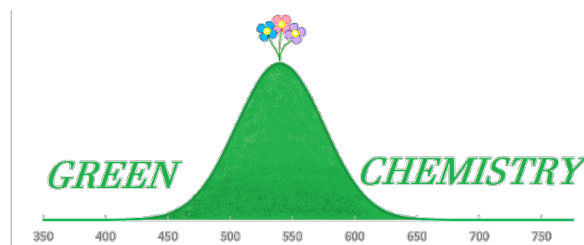
and copper from solution. So much so that a visible decrease in coloration of the solution occurred. Although more research needs to be done to understand how the byssus takes up metals beyond the known binding sites in its structure, byssus provides great promise to metal ion removers due to its availability. It has also been suggested that the byssus can be recycled and actually be used as a tool to recover metal rich solutions after it has been removed from the environment. In a field growing constantly, these initial studies on the byssus from mussels can hopefully forge a path for a revolutionary development in metal ion removers.



Solutions before and after byssus metal ion uptake. A clear reduction in color from initial solutions was observed, indicating significant uptake of metal ions from solution.

Read more about this study:

1. Montroni, D., Giusti, G., Simonia, A. et al. Metal ion removal using waste byssus from aquaculture. *Sci Rep* 10, 22222 2020. <https://doi.org/10.1038/s41598-020-79253-7>





*The University of Pittsburgh
Department of Chemistry*

is proud to announce

The Wass and McKeever

*Summer Undergraduate
Research Fellowships*

- **T**he Undergraduate Research Fellowship will be awarded this Summer 2021.
- **T**his Fellowship will provide a Summer stipend of \$3,500.00 to the recipient for work carried out in the research lab of our faculty member.
- **P**lease submit a letter of recommendation from a Faculty Mentor which includes your qualifications and details of the planned research project (1-2 pages) and a **one** page personal statement of your future goals to **Dr. George C. Bandik in Room 107 Chevron Science Center by February 15, 2021**. All nominations will be reviewed by our Undergraduate Curriculum Committee and the recipient will be recognized at our Undergraduate Spring Term Awards Ceremony within the University of Pittsburgh, Department of Chemistry.

Deadline to receive all materials for this Fellowship is February 15, 2021.



American Chemical Society

Student Affiliates, University of Pittsburgh

Membership Application

This is a powerful professional organization for the benefit of individuals interested in chemistry and related fields. Our organization offers exciting extracurricular activities and many outstanding opportunities for our members, including:

- 1 WEEKLY MEETINGS**-to plan activities, provide interesting speakers, discuss ideas, and keep students aware of what is happening in the scientific community.
- 2 ANNUAL TRIPS**-Each year we sponsor (a) trip(s), to external chemistry environments, as well as for social enjoyment. Significantly reduced rates are available to active members. In the past few years we have traveled to New Orleans, Atlanta and New York.
- 3 PROFESSIONAL NETWORKING**-Our organization has many opportunities to make contacts with professionals in both the scientific industry and academia. Student affiliates also have the opportunity to join the National ACS.
- 4 SOCIAL ACTIVITIES**-We sponsor many activities throughout the year just for fun.

Our meetings are held every Friday at 12:00 noon in Room 150 Chevron Science Center. To join, complete the application form below and come to one of our meetings. Our first meeting will be January 29, 2021 but you may join any time throughout the year.

Name: _____				
School Address: _____				

Permanent Address: _____				

School Phone: _____		Home Phone: _____		
Major: _____	Year in School	Fr.	So.	Jr. Sr.
E-mail: _____				
May we include your name, number and e-mail on the published phone list?		YES	NO	

To submit this form by mail, send it to ACS-SA, Box 24, Chevron Science Center, University of Pittsburgh, Department of Chemistry, Pittsburgh, PA 15260. Be sure to include the \$15.00 dues (make checks payable to the University of Pittsburgh). It is possible to be active even if you can not attend the meetings. For more information, see our display case in the lobby of Chevron Science Center.

