5ª Jornada de Doctorandos

Escuela de Doctorado Universidad de Valladolid

"Comparative uptake study of toxic elements from water by green microalgae: multimetallic and monometallic systems"

Ricardo Saavedra[a,b], María Elisa Taboada[a], Raúl Muñoz[b], Silvia Bolado[b]*

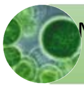
a Department of Chemical Engineering, Antofagasta University, Universidad de Antofagasta Avenue 02800, CP 1240000, Antofagasta, Chile

b Department of Chemical Engineering and Environmental Technology, Valladolid University, Dr. Mergelina, s/n, 47011, Valladolid, Spain.

Introduction & aims

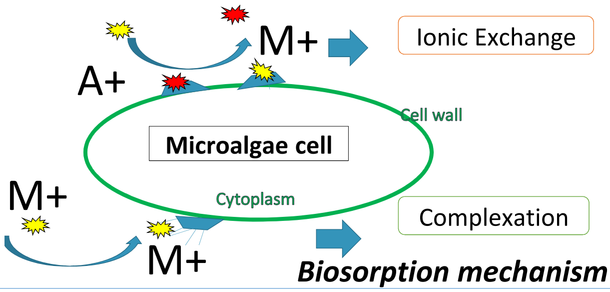
Water pollution by toxic minerals is a big problem that affect millons of people in the world.

Bioremediation emerged as a sustainable and environmental friendly alternative to control water pollution.



Microalgae can retain and/or accumulate some toxic elements, so they are considered as new remediation agent.

"Study uptake capacity of toxic elements by green microalgae species at different conditions"



Biosorption mechanism

Materials & methods

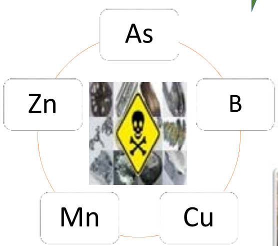
Microalgae species + Toxic elements → **Biosorption studies**

Scenedesmus almeriensis

isolated from area study

Chlorella vulgaris

Chlamydomonas reinhardtii



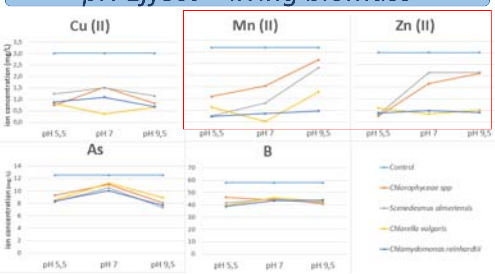
- Monometallic
- Multimetallic

Conditions

pH	5.5 – 7.0 - 9.5
Type of biomass	Living or non-living
Contact time	10 min – 3h

Results & Discusion

pH Effect – living biomass



Living vs non-living

Monometallic vs Multimetallic (living biomass)

Conclusions

<u>In pH effect determination:</u> - The maximum Cu, Mn and Zn removal was achieved by *Chlorella vulgaris* at pH 7.0.
- The acid pH (pH 5.5) enhanced Mn (II) and Zn (II) uptake capacity by *Scenedesmus almeriensis* and *Chlorophyceae spp*, species.

<u>Comparing living vs non-living studies:</u> - Living biomass were favored in As and B studies.
- *Chlamydomonas reinhardtii* was the unique microalgae with a better yield in living biomass, so that could be considered as a good bioremediation agent for heavy metal removal in further studies.

<u>Comparing Monometallic and multimetallic studies</u>: -Interactions among ions changed uptake capacity :
Improving: As, Cu and Zn ; Decreasing: B and Mn (3/4 cases)
-*Chlorella vulgaris* shown better yield in uptake capacity in Cu-Mn-Zn monometallic studies

Acknowledgments

Authors thank "INIA", "FEDER" fundings, "MINECO" (RTA2013-00056- C03-02), "JCyL" (VA094U14) and CONICYT- Chile for funding and support

Next Steps

Desorption studies → **Fixed bed Studies**

GOBIERNO DE ESPAÑA — MINISTERIO DE ECONOMÍA Y COMPETITIVIDAD — INIA Instituto Nacional de Investigación y Tecnología Agraria y Alimentaria — Junta de Castilla y León — Fondo Europeo de Desarrollo Regional — PURALGA RTA2013-0056-C03 — Environmental Technology Group University of Valladolid