



*“Gheorghe Asachi” Technical University of Iasi, Romania*



---

## MERCURY IMMOBILIZATION IN MINING WASTE SOILS USING THIOL-MODIFIED OLIVE STONES BIOCHAR

**Alfredo Ceroni-Galoso<sup>1</sup>, Dalia Carbonel<sup>1\*</sup>, Jhony Fredy Huarcaya-Nina<sup>1</sup>,  
Stephany Janeth Esquivel-Lorenzo<sup>1</sup>, Henry Colorado<sup>2</sup>, Mery Cecilia Gomez-Marroquín<sup>1</sup>**

<sup>1</sup>*National University of Engineering, 210 Túpac Amaru Ave, Rímac, Lima, 25, Peru*

<sup>2</sup>*CCComposites Laboratory, Universidad de Antioquia UdeA, Calle 70 No. 52-21, Medellín, Colombia*

---

### **Abstract**

Mercury, a persistent, mobile, and toxic pollutant, often contaminates soils due to mining activities. This study investigates the use of thiol-modified biochar derived from olive stones to immobilize mercury in a tailings-contaminated soil sample from the National University of Engineering, Peru. The soil, characterized by high heavy metal concentration, acidic pH, and sandy composition, underwent a 10-week incubation with varying biochar amounts, leading to a 53-73% immobilization of the available mercury. The primary immobilization mechanism could be attributed to complexation between biochar functional groups and soil mercury. Results confirmed biochar addition progressively reduced mercury concentration. Despite thiol addition reducing the biochar's specific surface area due to pore clogging, the surface functionalization was successful, evident from chemical analysis. However, decreased fixed and elemental carbon content likely resulted from the initial feedstock content and pyrolysis conditions. Our findings suggest thiol-modified olive stone biochar as a promising, cost-effective solution for mercury immobilization in contaminated soils.

*Key words:* available mercury, bio-adsorbent, mercaptoethanol, mining activities

*Received: August, 2022; Revised final: June, 2023; Accepted: June, 2023; Published in final edited form: June, 2023*

---

---

\* Author to whom all correspondence should be addressed: e-mail: [dcarbonelr@uni.pe](mailto:dcarbonelr@uni.pe); Phone: +51-948967949