IOCM 2025 Conference

The 4th International Online Conference on Materials

3–6 November 2025 | Online

MDPI

Sustainable Valorization and Characterization of Rice Husk as a Potential Bioadsorbent

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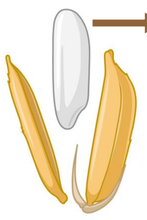
INTRODUCTION

500 million tons of rice are expected to be produced by 2025. (FAO)

Mature rice plant



→ Rice grain: food source

→ Rice husk: agro-industrial waste who comprise about 20% of the total grain mass

Using rice husk as a bioadsorbent represents a sustainable solution for waste reuse and environmental preservation.

OBJECTIVE

This study aim to obtain and characterize the physicochemical properties of rice husk and evaluate their potential as a bioadsorbent.

METHOD

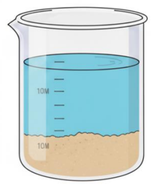
Raw rice husk after washing and drying

Grinding performed with a knife mill equipped with a 9-mesh sieve

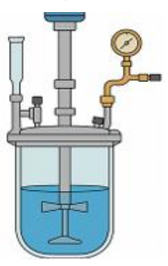
Treatment with 5% NaOH solution

Neutralization and Washing

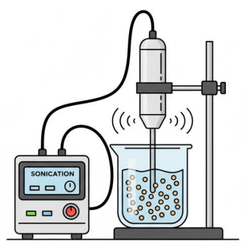
Oven drying



Fiber hydration



Steam explosion reactor



Sonicator at 455 watts

Oven drying

Fiber with bioadsorbent potencial

RESULTS & CONCLUSION

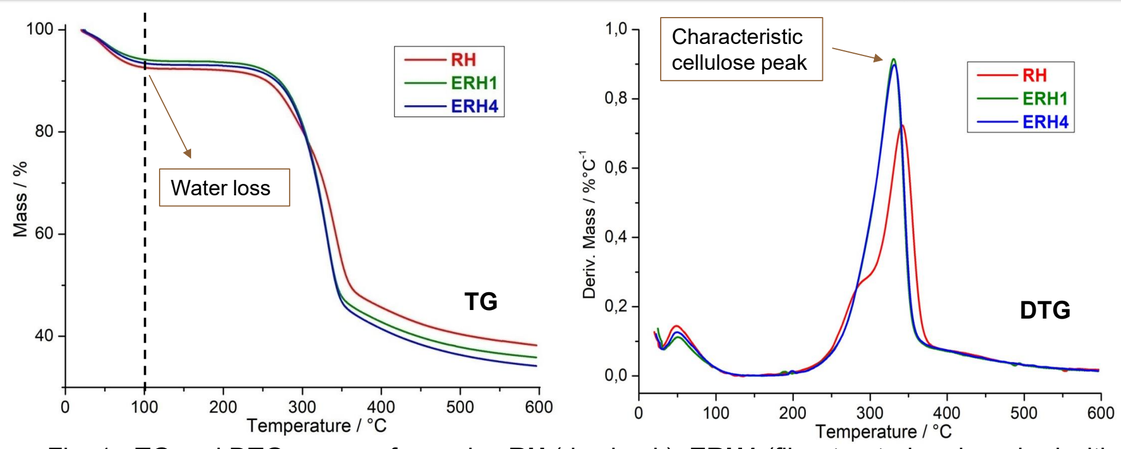
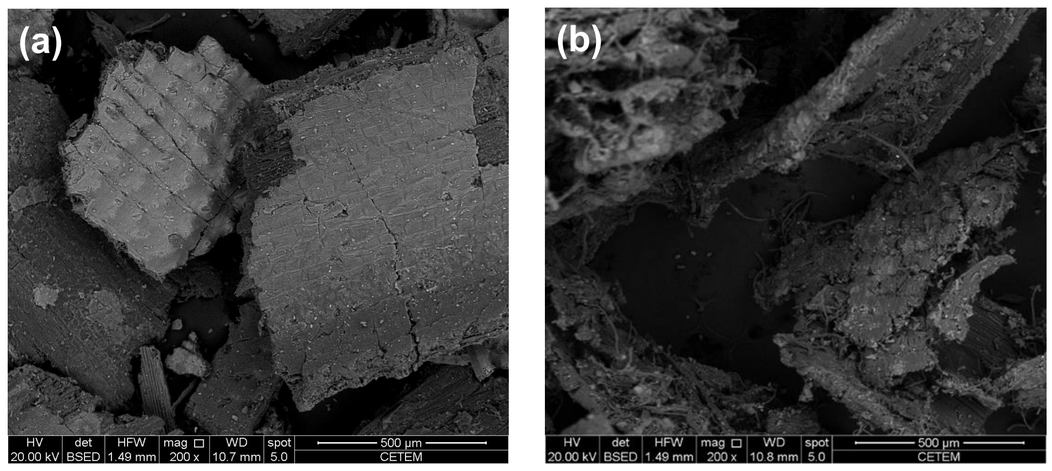


Fig. 1 - TG and DTG curves of samples **RH** (rice husk), **ERH1** (fiber treated and washed with H_20) and **ERH4** (fiber treated, neutralized with acetic acid solution and washed with H_20).



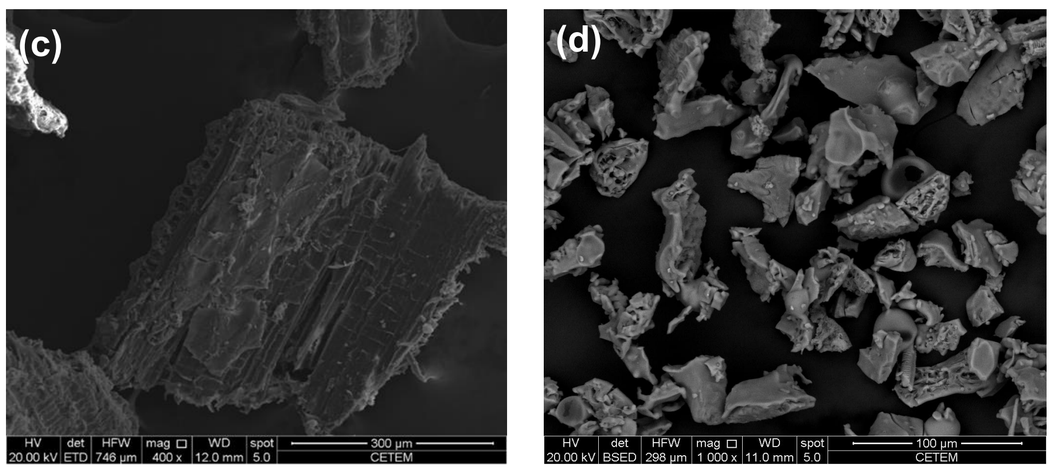


Fig. 2 – Micrographs of samples (a) **RH**, (b) **ERH1**, (c) **ERH4** and (d) **LAC** (activated carbon)

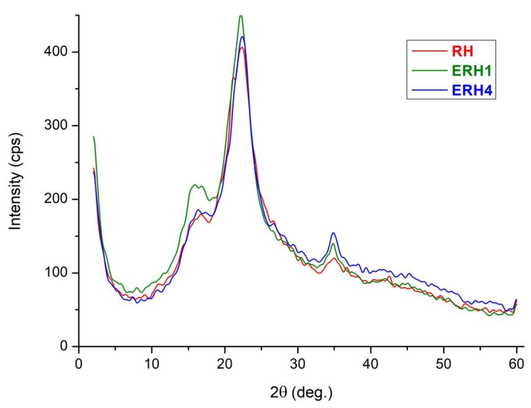


Fig. 3 – DRX of fibers samples

Sample	ICUMSA (IU) color
Untreated solution	**72.6**
XERH1	**24.2**
XERH4	**32.3**
XLAC	**52.7**

Table 1 - ICUMSA color results of solutions treated with different adsorbents: modified fibers (**XERH1** and **XERH4**) and activated carbon (**XLAC**)

Chemical and mechanical treatments were successfully performed to reach microstructures. The modified material showed an approximately 60% reduction in color intensity in beverage additive solution, confirming the sustainable potential of cellulose from rice husk as a bioadsorbent material.

ACKNOWLEDGMENTS

FAPERJ Fundação Carlos Chagas Filho de Amparo à Pesquisa do Estado do Rio de Janeiro

CNPq Conselho Nacional de Desenvolvimento Científico e Tecnológico

CAPES

Laboratório de Análise Térmica Prof Ivo Giolito Rj