Sociedad Argentina de Microbiología General

XIX CONGRESO DE LA SOCIEDAD ARGENTINA DE MICROBIOLOGÍA GENERAL

22 al 25 de octubre del 2024
Centro cultural y Pabellón Argentina de la Universidad Nacional de Córdoba, Córdoba, ARGENTINA.

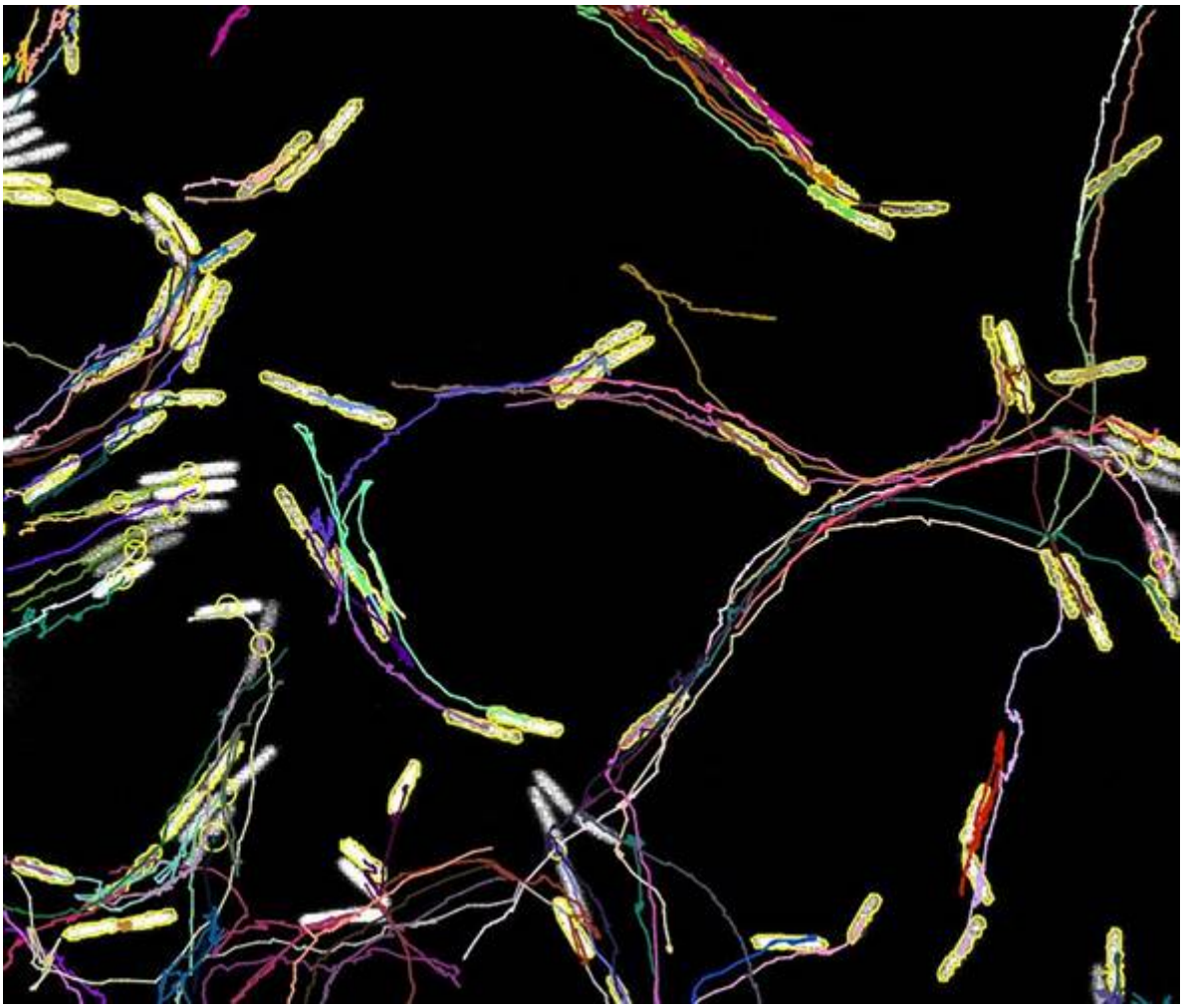

Foto: Se hace camino al andar. Celeste Dea. 1er puesto. Concurso fotográfico SAMIGE 20 años.

21 - Biotecnología y Bioprocesos

CHARACTERIZATION OF MICROALGAE-FUNGI PELLETS BIOMASS USING FT-IR

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Microalgae offer great potential for various industries due to their rapid growth, high lipid content, and photosynthetic efficiency. However, the economic viability of microalgae production is often hampered by inefficient harvesting methods. Fungal-assisted bioflocculation emerges as a sustainable solution, enabling simultaneous microalgae harvesting and the production of valuable bioproducts while reducing the need for harmful chemicals and energy-intensive processes. Fourier transform infrared (FTIR) spectroscopy is an analytical method, which involves the measurement of infrared absorption in relation to a range of molecular vibrational modes and can be used to identify the functional groups in microorganisms. This study aimed to characterize the surface functional groups of pure algae, fungi, and algae-fungi pellets using Attenuated Total Reflectance-Fourier Transform Infrared (ATR-FTIR) spectroscopy. The microalgae used in this study were previously isolated (CMI012, CMI015, CMI016 and CMI018) and immobilized in the hyphal matrix of the edible fungal strains *Pleurotus pulmonarius* and *Lentinus sajor-caju*. Microalgae were harvested in fungal pellets using the same methodology described in Miño *et al*. (2023). The pellets, characterized by a diameter of 1-1.5 mm and an initial microalgae concentration of OD750=0.5, were subsequently lyophilized and ground into powder. The resulting powders were analyzed using ATR-FTIR spectroscopy (Shimadzu IRSpirit). Spectra were collected within the frequency range of 600-4000 cm-1 with a resolution of 4 cm-1 and 50 scans averaged per sample. FTIR spectra were analyzed using Origin software, and identification of functional groups was based on comparison with reference literature. FTIR analysis revealed similar spectral patterns for all materials, with variations primarily in peak intensity. A consistent peak at 1033 cm-1, indicative of C-O stretching in carbohydrates, was observed across all samples. The peaks at 1247 cm-1 and 1540 cm-1 were indicative of C-N stretching in amine groups and N-O stretching in nitro compounds, respectively. The peak at 1647 cm-1 was likely associated with the C=C bond of alkenes. Furthermore, the peak at 1745 cm-1 was possibly attributed to C=O stretching in the ester linkages of fatty acids. In this study, an intensified peak at 1350 cm-1 was observed in the immobilized algae-fungi biomass, suggesting an increased exposure of C-H groups. The overall peak intensities of the immobilized pellets fell within the range observed for the pure fungi and algae samples. FTIR spectroscopy is a valuable tool for analyzing the biochemical composition of microalgae-fungi pellets. It can effectively identify key

functional groups, providing insights into molecular interactions and changes during bioflocculation. FTIR offers a rapid and cost-effective method for characterizing pellet compositions, enhancing our understanding of microalgae-fungi interactions.

Palabras clave: Bioflocculation- FTIR spectroscopy - Functional Groups