Sociedad Argentina de Microbiología General

XIX CONGRESO DE LA SOCIEDAD ARGENTINA DE MICROBIOLOGÍA GENERAL

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Centro cultural y Pabellón Argentina de la Universidad Nacional de Córdoba, Córdoba, ARGENTINA.

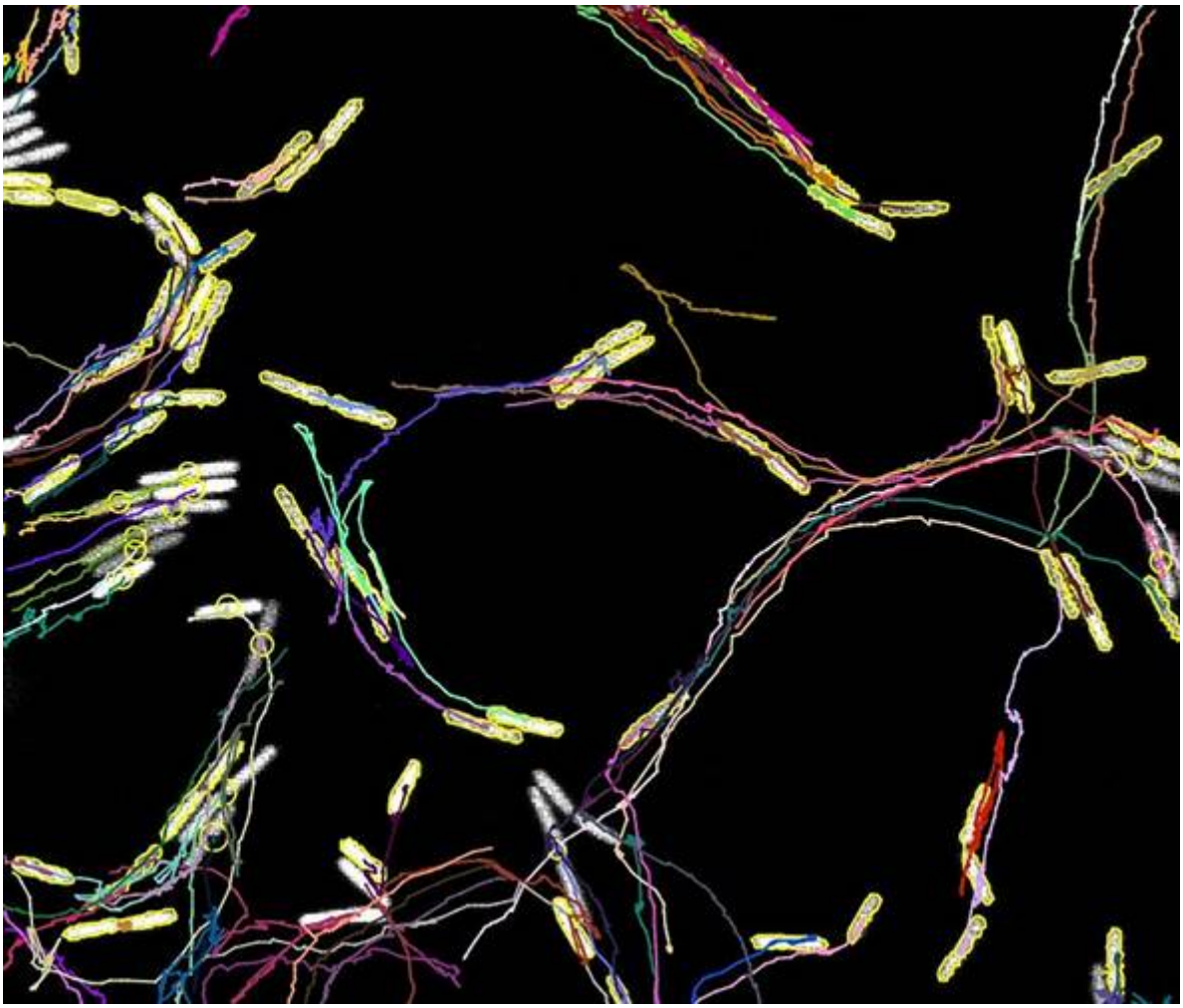

Foto: Se hace camino al andar. Celeste Dea. 1er puesto. Concurso fotográfico SAMIGE 20 años.

219 - Biotecnología y Bioprocesos

MICROBIAL ENZYMES AS EFFECTIVE ENHANCED OIL RECOVERY (EOR) AGENTS

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The exploration of microorganisms, enzymes and metabolites of biotechnological interest has become a necessity to develop new technologies that can be used in various fields of industry. Biocatalysis is a key tool to develop more efficient and sustainable industrial processes in the transition to bio-based economies. In the petroleum industry, the potential of many enhanced oil recovery (EOR) methods depends on their influence on the fluid/rock system, wettability-related interactions, as well as fluid/fluid interactions. In this work, the effectiveness of microbial enzymes in the desorption of heavy oil in different systems was tested, starting from the premise that enzymes have the potential to favorably change these interactions, advancing to a real rock evaluation on a laboratory scale. Based on the performance in laboratory tests, extracellular enzymatic extracts of *Bacillus* sp. AR03 were selected and used as enzymes source. *Bacillus* sp. AR03 was isolated from pulp and paper raw material and is a cellulase-producing bacterium with carbohydrate active enzymes as relevant enzymatic activity. Crude oils with API degrees between 15 and 24 were used. Surface and interfacial tensions were measured as well as wettability test and contact angle with the selected systems including sandstone. Desorption analysis using enzymes in combination with surfactant were performed at different concentrations, and at 60°C and high salinity conditions. Crude oil desorption was assayed combining enzymes with surfactants, at different concentrations in an equal proportion sand/oil system to select the system that have the best performance. Imbibition analysis was performed from the selected systems using Amott cups. During flooding tests, proteins and enzymatic activities were monitored. SARA analysis (saturated, aromatic, resins, asphaltenes), CG-mass and HPLC showed changes in the composition of the crude oil, with increasing the signal of the peaks with smaller MW. Enzyme supernatant of *Bacillus* sp. A03 could modify interfacial tension (IFT), but it’s not enough to desorb crude oil, while an anionic surfactant enhanced wettability and desorbing activity of the enzyme extract. In conclusion, enzymatic EOR emerges as an effective and environmentally friendly technology for enhanced oil recovery in mature fields.

Palabras clave: enhanced oil recovery - EOR - Bacillus sp. A03 - surfactant