

## Endemic igneous rock as a proposal of bracket material media for the growth of a microbial oxidizing sulphate consortium

Benjamín Hernández-Figueroa<sup>1</sup>, Antonino Pérez-Hernández<sup>2</sup>, Velvett G. Domínguez-Méndez<sup>1</sup>, Beatriz A. Rocha-Gutiérrez<sup>1</sup>, Lourdes Ballinas-Casarrubias<sup>1</sup>, Héctor A. López-Aguilar<sup>2</sup>, Jorge-Gómez<sup>3</sup>, Ma. Del Rosario Peralta-Pérez<sup>1\*</sup>

<sup>1</sup> Universidad Autónoma de Chihuahua, Facultad de Ciencias Químicas;

<sup>2</sup> Centro de Investigación en Materiales Avanzados;

<sup>3</sup> Universidad Autónoma de Ciudad Juárez \*mperalta@uach.mx

### INTRODUCTION

Gross biogas contains hydrogen sulfide (H<sub>2</sub>S) (0.1–3% v/v)<sup>[1]</sup>. According to the World Health Organization (WHO), exposure to H<sub>2</sub>S above 500 ppm can lead to death<sup>[2]</sup>. On the other hand, H<sub>2</sub>S corrodes steel, including stainless steel. The biofiltration process is an effective and friendly technology with the environment, it is based on the use of sulphate oxidizing bacteria (SOB), with the ability to transform H<sub>2</sub>S to less toxic compounds<sup>[3]</sup>. The biofilters, can be packed with a variety of adsorbent materials, previously inoculated with SOB. Nevertheless, the products of the oxidation of H<sub>2</sub>S and the biomass production into biofilters limits their use<sup>[4]</sup>. The objective of this research was to evaluate the removal of H<sub>2</sub>S, of a stream of biogas produced in a biodigester, using a fluidized bed biofilter prototype packed with igneous rock.

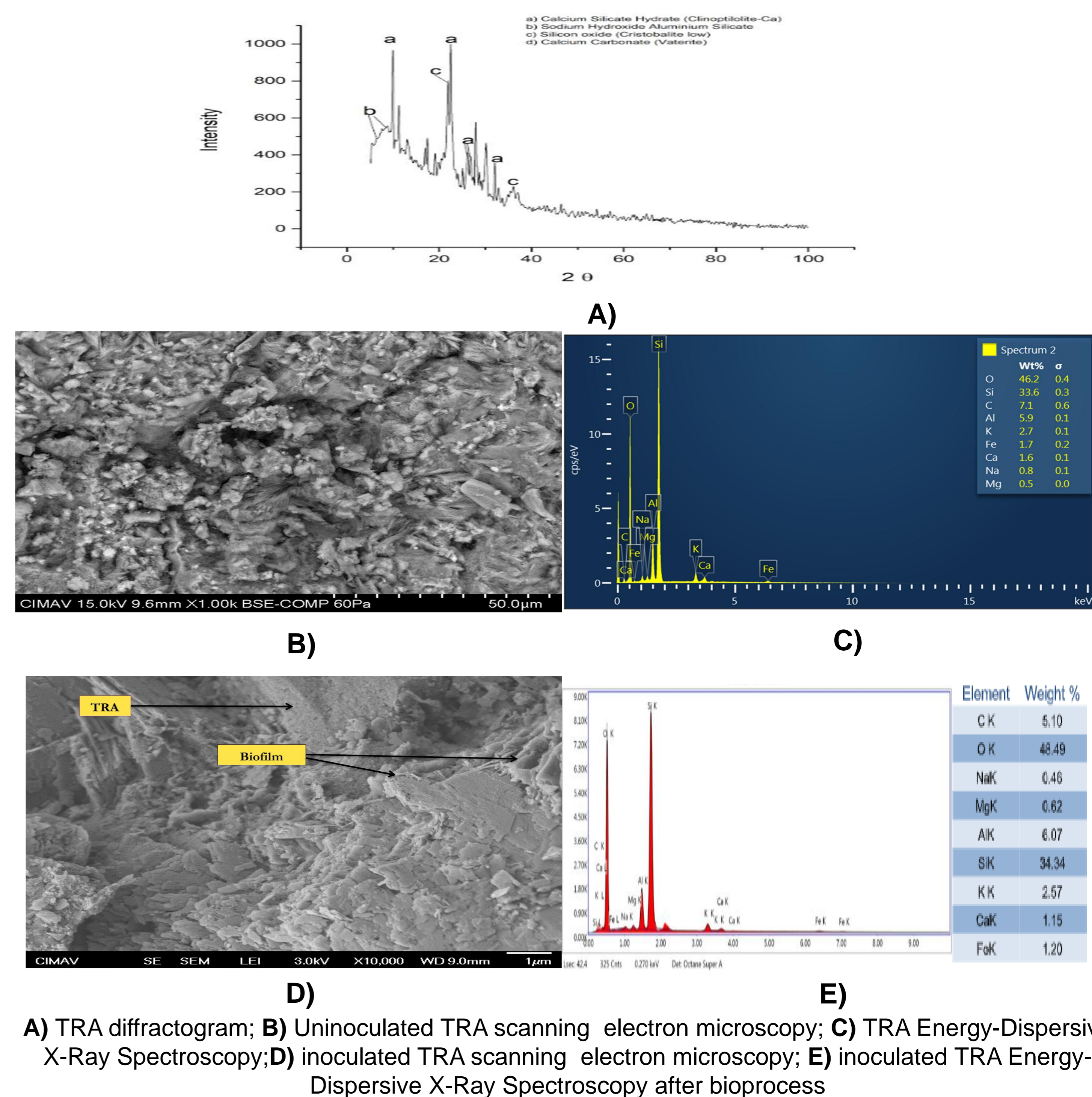
### OBJECTIVES

- Cultivate a stable biofilm with sulfate-oxidant capacity on TRA (Altered Reolithic Tuff)
- Characterize TRA as a bracket material media, for the development of sulfate-oxidizing biofilm
- Assess the biofilm's oxidizing sulfate capacity, through the construction of biotrickling filter

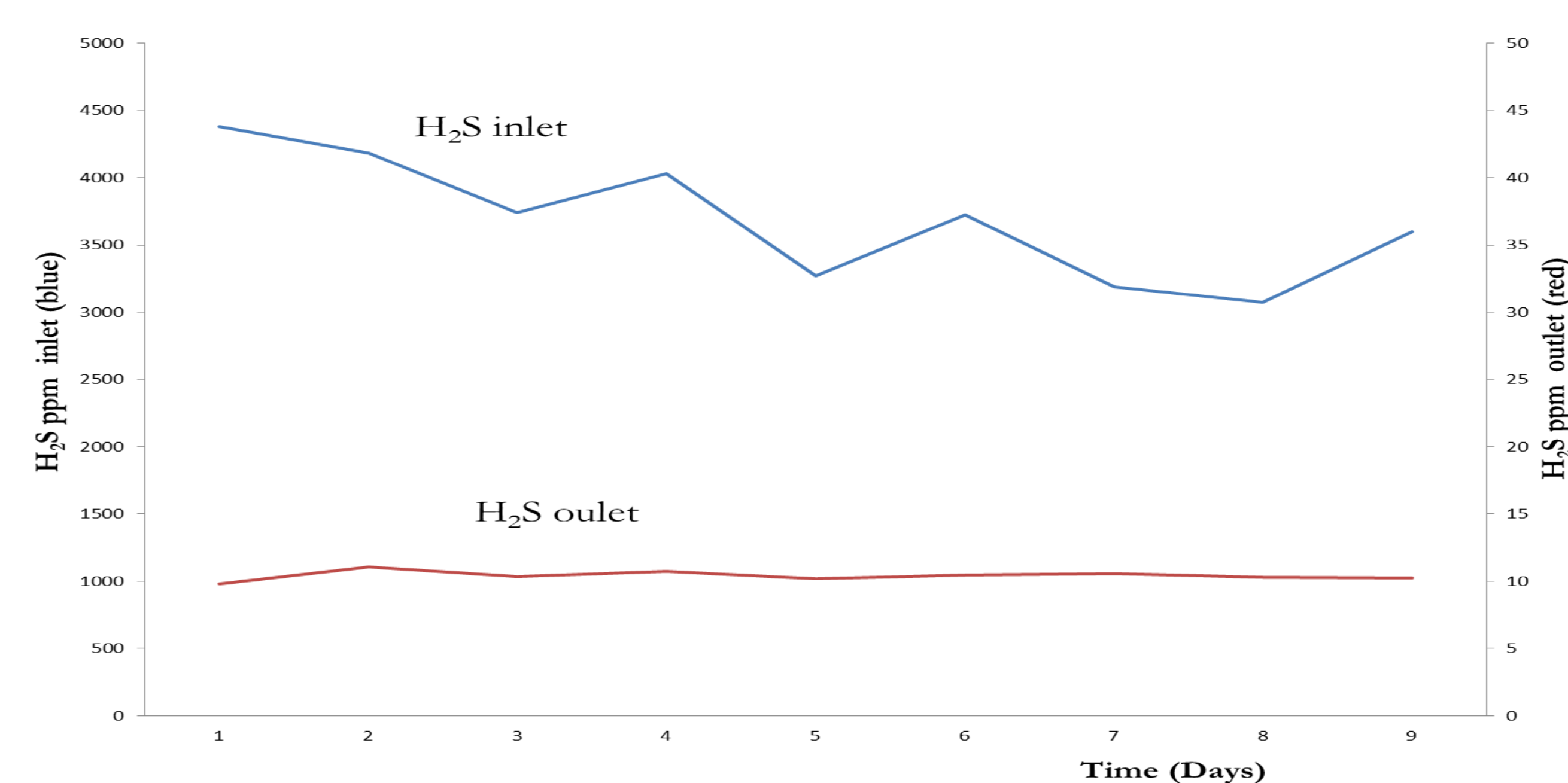
### METHODOLOGY



### RESULTS



**A)** TRA diffractogram; **B)** Un inoculated TRA scanning electron microscopy; **C)** TRA Energy-Dispersive X-Ray Spectroscopy; **D)** inoculated TRA scanning electron microscopy; **E)** inoculated TRA Energy-Dispersive X-Ray Spectroscopy after bioprocess



### DISCUSSION

**Table 1.** Trends in bracket for biotrickling filter and their percentage of H<sub>2</sub>S removal.

Bracket	H <sub>2</sub> S inlet	H <sub>2</sub> S removal efficiency (%)	Author
Lava rock	7.5–150 (gm <sup>-3</sup> h <sup>-1</sup> )	60–99	Cheng et al., 2016 <sup>[5]</sup>
Compost curing	35.8-179.25 ppm	95	Hou et al., 2016 <sup>[6]</sup>
Concrete waste	100 ppm	70	Jaber et al., 2017 <sup>[7]</sup>
TRA	4000 ppm	99	Hernández et al., 2019

Based on the results obtained, biofilm with sulfate-oxidant capacity inoculated on the proposed bracket material (TRA). Has greater H<sub>2</sub>S removal efficiency (99%) in the biogas stream, than bio systems that use different bracket materials (Table 1).

### CONCLUSIONS

- ✓ TRA has the property of being a good adsorbent material for the development of sulphate-oxidant microbial consortia.
- ✓ The biofilm inoculated on TRA, has sulfate-oxidant capacity, removing up to 4000 ppm of H<sub>2</sub>S.

### REFERENCES

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