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**Environmental Chemistry for Sustainability**

**E-Book of Abstracts**

 **EuChemS**  
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## Removal and biodegradation of saturated petroleum hydrocarbons from water samples by microorganisms immobilized on biochar

N. Lugonja<sup>1\*</sup>, I. Despotović<sup>2</sup>, S. Miletic<sup>1</sup>, V. Beškosić<sup>2</sup>, B. Jovančičević<sup>2</sup> and G. Gajica<sup>1</sup>

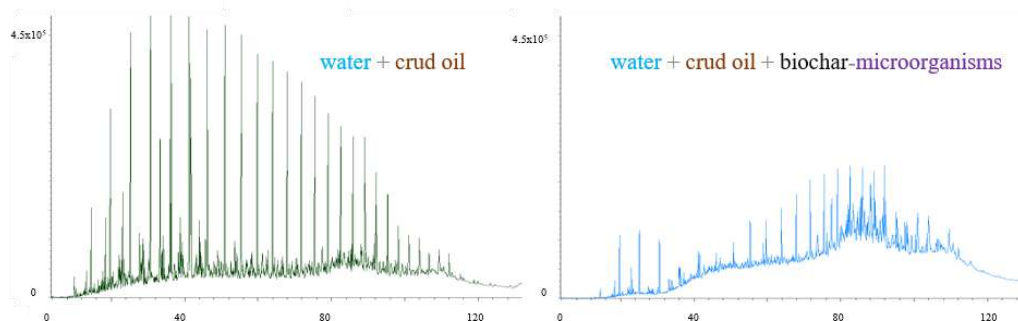
<sup>1</sup>University of Belgrade, Institute of Chemistry, Technology and Metallurgy, Njegoševa 12, 11000 Belgrade, Serbia

<sup>2</sup>University of Belgrade, Faculty of Chemistry, Studentski trg 12-16, 11000 Belgrade, Serbia

[nikoleta.lugonja@ihm.bg.ac.rs](mailto:nikoleta.lugonja@ihm.bg.ac.rs), [ignjat.despotovic3@gmail.com](mailto:ignjat.despotovic3@gmail.com)

Crude oil, one of the final products of the transformation, migration, and accumulation of organic matter in sedimentary rocks, can enter and contaminate water systems through various leaks, accidents and spills [1]. The removal of petroleum pollutants from aquatic systems can be accomplished through expensive and inefficient physical and chemical methods or by more environmentally friendly bioremediation [2].

Since numerous researches have shown that immobilized microorganisms have higher biodegrading abilities compared to free cells due to the high adsorption ability of the carrier, protective environment, and better oxygen, nutrient, and pollutant distribution, in this study, bioremediation of crude oil was performed using microorganisms immobilized on biochars [3]. The microbial cells were isolated from oil-contaminated soil before the bioremediation and immobilized on biochar through basic inoculation. For control samples, bioremediation was monitored both in water containing free cells and in water containing neither microorganisms nor biochar. The experiment was carried out in three equal stages for 96 days. After 96 days, it was observed that more than 95% of crude oil was removed in each sample containing the combination of microorganisms and biochar. On the other hand, mostly *n*-alkanes and isoprenoids were biodegraded, while aromatic hydrocarbons and polycyclic hydrocarbons type steranes and terpanes did not undergo significant bioremediation, which was as expected according to the order of biodegradation of these compounds [1].



**Figure 1.** Total ion chromatogram of saturated hydrocarbons fraction at the beginning (left) and after 96 days of bioremediation (right)

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### References

- [1] J. Schwarzbauer, B. Jovančičević (2018) ‘Organic pollutants in the geosphere’, Springer, Netherland.
- [2] F. A. Samhan et al. (2017) ‘Bioremediation of oil-contaminated water by bacterial consortium immobilized on environment-friendly biocarriers’, *Journal of the Egyptian Public Health Association*, vol. 92, pp. 44–51, doi: <https://doi.org/10.21608/EPX.2018.6649>.
- [3] Z. Bayat et al. (2015) ‘Immobilization of Microbes for Bioremediation of Crude Oil Polluted Environments: A Mini Review’, *Open Microbiol Jorنال*, vol. 9, pp. 48–54, doi: <https://doi.org/10.2174/1874285801509010048>