

Artificial Aging of Crude Oil and Water Remediation by AOPs

Laura Scrano¹, Filomena Lelario¹, Jean Marc Chovelon³, Sabino Aurelio Bufo^{1,2}

¹ *University of Basilicata, Potenza, Italy,* ² *Department of Geography, Environmental Management & Energy Studies, University of Johannesburg, South Africa*

³ *IRCELYON - Institut de recherches sur la catalyse et l'environnement de Lyon, France*

Abstract content {Max words limit 250}

Crude oil in the environment is exposed to a series of weather-climatic factors (water, oxygen, solar irradiation) and microorganisms' action that triggers chemical-physical processes of degradation (known as weathering). In a short time, the original composition of exposed oil can change significantly. In this work, our research team experimented with an Italian crude oil simulating solar irradiation to understand the modifications induced on its composition by artificial aging. Moreover, we studied the transformations deriving from different advanced oxidation processes (AOP) applied as remediation methods on liquid matrices contaminated by petroleum. For the last objective, we adopted different AOPs (photocatalysis, sonolysis, and sonophotocatalysis). as a photocatalyst, we used TiO₂ immobilized on a non-woven fabric sheet. Crude oil and its water-soluble fractions were analyzed using GC-MS, ¹H-NMR in a liquid state, Fourier transform ion cyclotron resonance mass spectrometry (FT-ICR-MS), and fluorescence. The artificial oil aging induced significant modifications of oil composition with the formation of more oxidized species. All treatments used for the detoxification of polluted water samples, except sonolysis, showed a consistent reduction of organic content with the appearance of potentially toxic substances, confirming that the remediation processes experimented with cannot be applied in natural environments without a careful and repeated experimentation in controlled laboratory conditions.



Biography with photo

Associate Professor SSD AGR/13

Visiting professor IUT, University Claude Bernard, Lyon 1, France

ANVUR disciplinary expert

Qualified as Full Professor SSD AGR/13

Prof. Scrano has been involved as a co-proposer in four national and international research projects, and she coordinated one of them. She is the author/co-author of many scientific articles published in international referenced journals (indexed Scopus) and of several scientific papers published in national journals and national and international conference proceedings, in two which she has obtained a prize for the scientific activity developed.

Prof. Scrano studies the properties that allow some clay minerals to retain organic molecules present in

the soil, including some herbicides of the latest generation, and how the constituents of the soil (organic matter and clay minerals) influence the degradation process).

Presenting author details

Full name: Laura Scrano

Linked In account: [linkedin.com/in/laura-scrano-1b65843b](https://www.linkedin.com/in/laura-scrano-1b65843b)

ORCID 0000-0002-3716-2666

Scopus ID [https://www.scopus.com/authid/detail.u](https://www.scopus.com/authid/detail.uri?authorId=6603198824)

Google Scholar ID [https://scholar.google.com/citations?hl](https://scholar.google.com/citations?hl=it&user=ub3PP-IAAAAJ)

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