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Editorial

Current Perspective on the Study of Liquid–Fluid Interfaces: From Fundamentals to Innovative Applications

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Liquid–fluid interfaces are ubiquitous systems, having a paramount importance for daily life as well as for academia, providing the basis for the study of different aspects of interest for medicine, biology, and physics. Moreover, liquid–fluid interfaces emerge as very promising platforms enabling the fabrication of a broad range of functional materials as a result of the novel properties resulting from quasi-2D confinement [1,2]. This drives extensive research activity trying to shed light on the most fundamental physico-chemical aspects underlying the formation of liquid–fluid interfaces, as well as the properties emerging as a consequence of the quasi-2D confinement forced by the presence of a liquid–fluid interface [3,4]. For instance, the flows emerging from the presence of an interface play a central role in a broad range of industrial and biological aspects in which liquid–fluid interfaces are involved. Thus, the reorganization of materials within a liquid–fluid interface during the compression–expansion of the alveoli as well as the exchange of material from such interfaces and the adjacent liquid layer are essential for breathing, and any dysfunction on the interfacial flows occurring during expiration–inspiration cycles can result in an acute respiratory distress syndrome [5,6]. On the other hand, interfacial flows also play a very important role in the foaming and detergency abilities of most detergents and shampoos [7,8] and in many other processes of industrial and technological relevance, including icing-deicing processes, fouling, tertiary oil recovery, drug delivery, diffusion in porous matrices, ink-jet printing, and tissue engineering [9,10].

According to the above discussion, the study of liquid–fluid interfaces is a broad field with multiple implications. Therefore, the study of this type of system deserves importance, and this Special Issue tries to bring together different studies, providing a general overview of the current perspectives offered in the study of liquid–fluid interfaces. This is only possible in the context of combining a series of research papers and reviews dealing with different experimental and theoretical studies involving liquid–fluid interfaces, expanding on the exploitation of different phenomena occurring in liquid–fluid interfaces to understand specific phenomena of biophysical relevance, e.g., the impact of inhaled pollutants on normal respiratory function [11], and the use of advances in characterization techniques for the evaluation of phenomena and processes occurring within the interface [12,13].

Moreover, liquid–fluid interfaces play a very important role in the control of the flows occurring under different boundary conditions and their implications in different processes with technological and industrial interest. For instance, an accurate modelling of the flows occurring within porous systems can help in the optimization of different processes, including tertiary oil recovery and froth flotation [14–17]. Furthermore, the interfacial flows also contribute to spreading and evaporation phenomena, influencing the performance of different industrial processes, lubrication, and heat dissipation [18–21].

In summary, the study of the phenomena and applications involving liquid–fluid interfaces requires a broad perspective, which in current years is structured as a multidisciplinary challenge involving theoretical and experimental aspects to solve very complex problems. This Special Issue, together with the previous one entitled "Fluid Interfaces" [22]

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and the topic entitled "Insight into Liquid-Fluid Interfaces" [23], are focused to provide a comprehensive perspective on the current understanding of the study of liquid/fluid interfaces, contributing to open new avenues that close the gap between the most fundamental aspects of liquid–fluid interfaces and their potential applications.

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Short Biography of Author

Eduardo Guzmán, Associate Professor at the Physico-Chemistry Department and researcher at the Multi-disciplinary Institute in the Complutense University of Madrid (Spain), received his MSc in Chemistry and in Science and Technology of Colloids and Interfaces, and his PhD in Science at the Complutense University of Madrid (Spain). After his PhD, he worked for a period of four years at the Istituto per l'Energetica e le Interface in Genoa (Italy), after which he returned to his alma mater. He has published over 100 papers in JCR journals and 12 chapters in books (https://orcid.org/0000-0002-4682-2734), H-index 32, and has co-authored more than 100 contributions to different national and international conferences. His main research interests are LbL assembly, interfacial rheology, drug delivery, biophysics, cosmetics, and pest control. He has been the supervisor of 3 PhD students, 10 Master students and 25 undergraduate students. He has been involved in 2 EU and 6 Spanish-funded founded I+D grants and has been scientifically responsible for 4 cooperation projects between academia and industry. He is a member of the editorial board of different scientific journals, including Advances in Colloid and Interface Science, Colloids and Interfaces, Coatings (Editor in Chief of the Section "Liquid-Fluid Interfaces"), Polymers and Current Cosmetic Science, and has edited special issues in Coatings, Processes, Polymers, and Advances in Colloid and Interface Science.