

EDITORIAL

Emerging and inter/trans-disciplinary research areas related to Chemistry

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Undoubtedly, Chemistry is a central science because it serves as a support and contributes to the development of many other disciplines, such as biology, geology, physics, paleontology, etc. Just by observing the environment that surrounds us, we can conclude that the world is composed of an infinite number of inert or living components, and all of them are composed of chemical substances of a broad range of complexity.

On the other hand, Chemistry has a direct relationship with the economic development of a country, due to most industries are based on chemical processes or materials. The impact of chemistry in different activities is high, in construction, ceramics, and steel, in the food, Energy or Petrochemical industry, in textile design, in Cosmetics and fragrances, in Agrochemicals and fertilizers, Pharmaceutical products, Water treatment, in Companies specialized in Environmental Chemistry, Manufacture of plastics and rubbers, quality and safety processes, in the mining industry, and so forth.

In the last decade, the areas very well defined for different first-generation disciplines have expanded blurring their borders and have led to the new generation of subjects where Chemistry occupies a predominant place. Materials Science and Technology, Theoretical and Computational Chemistry; and Medicinal Chemistry and Molecular Pharmacology, are examples of emerging and inter/trans-disciplinary research areas related to Chemistry as the core, in which the existing boundaries between the different areas of knowledge involved, blur interrelated in a multi / inter and transdisciplinary way.

Materials Science and Technology is an inter/transdisci-

plinary field involving research in a broad and diverse range of topics related to the design, synthesis, characterization, modeling, and use of materials, which have natural or incorporated properties and functions that add value to specific applications. Research projects in Materials Science connect the disciplines of science with design and engineering fields (electronics, electrical, chemical, civil, environmental, mechanical, aerospace, etc.), with areas such as geology, architecture, biology, medicine, and health professions. In this sense, the research activity of Materials Science highlights the need to connect different fields from their scientific and technological knowledge, indicating that education in Materials Science also requires an integrated trans-disciplinary approach¹.

Theoretical and Computational Chemistry involves the development of theories, programs (algorithms), and computational technology, allowing us today the careful study of the electronic structure of systems whose sizes made them prohibitive 40 years ago. The greater difficulty in the theoretical study of Chemistry is that, on all scales, it is a problem of many bodies whose solution and understanding remain an unsolved and fascinating scientific challenge. The results obtained through theoretical and computational chemistry have been used not only in the essential aspects of theoretical chemistry, but also in fields such as pharmacology, molecular biology, and organic or inorganic chemistry, to mention a few. This field has emerged as a useful tool that allows researchers to shorten research times, but also a better understanding of the phenomena involved².

Research in Medicinal Chemistry and Molecular Pharma-



ology involves various scientific disciplines and implies collaboration between researchers in the development of new drugs. Researchers in the area focus on the discovery and development of active principles and are concerned about the isolation of medicinal agents found in nature (plants, corals, etc.), as well as the creation of new synthetic compounds with potential biological activity. Medicinal Chemistry refers to the discovery, development, identification, and interpretation of the mode of action of biologically active compounds at the molecular level. It includes bioactive compounds in general. It also studies the identification and synthesis of metabolic products of drugs and related compounds. All this allows the development of products with high added value and well-defined pharmacological characteristics that constitute the basis of the drugs. This type of research is carried out with a multidisciplinary team of scientists, including chemists, biologists, toxicologists, pharmacologists, theoretical chemists, microbiologists, and biopharmaceuticals³.

Ecuador is a country with great potential in the industry where the role of a chemist should be fundamental. The School of Chemical Sciences and Engineering of Yachay TECH is determined to open in the closer future a Master's Program of Research in Chemical Sciences, seeking to have in Ecuador a fourth level program of research capable of covering, from Chemistry as a center, the three transversal and integrating areas mentioned before, that include Materials Science and Technology, Theoretical and Computational Chemistry; and Medicinal Chemistry and Molecular Pharmacology. For this,

we will offer an objective project, with a program of high academic quality focuses on research, but above all, we were seeking to be competitive at national, regional, and global levels.

We must not forget that science is expensive but, a change, doing quality science, leads to a more critical and formative University and, therefore, to the next generation of citizens with more and better resources and professional training, which will be reflected in the future development of the country.

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