

Editorial

Recent Advances in Biological and Catalytic Applications of Metal Complexes

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The use of metals in biological [1] and industrial [2] fields has been associated with human progress since approximately 11,000 years ago with the use of copper. The evolution of essential and non-essential metal use in medicine and industry, such as in biological functions, technological applications, and in obtaining catalytic benefits from the introduction of different metals to improve yields, has increased year-on-year, laying the foundations of human development. Metals are rarely used as a pure element; it is usually necessary to mix them with other elements to form an alloy to obtain the required properties of the material [3]. The physical and mechanical properties, material degradation, and biocompatibility of metals are critical factors to consider in order to select optimal combinations. One of the most successful options is the combination of metal centers with organic ligands, creating a synergistic effect on the properties of both components that gives rise to new, more specific systems to address biological and industrial challenges [4,5].

This Special Issue focuses on the structure and properties of metal complexes and their most recent advances in biological and catalytic applications by hosting a mix of original research articles and short critical reviews. The catalysis section includes a review conducted by Mastalir et al. [6] regarding Ullmann-type C–N heterocoupling N-arylation reactions performed in heterogeneous systems, focusing on the utilization of copper and palladium species immobilized on various support materials and modified by surface functionalization. Another review, this time focusing on the uses of Prussian blue analogs (PBAs), is provided by Prof. Isabella Concina [7]. The versatility of PBAs is due to their open framework, compositional variety, and fast and efficient internal charge exchange, coupled with a self-healing ability that makes them unique. The author's work describes the findings of the last decade in the field of the catalytic and photocatalytic application of PBAs in water remediation (via the degradation of organic pollutants and heavy metal removal) and the catalytic oxidation of organics and production of organic intermediates for industrial synthesis. Finally, a third review article by Prof. Gyurcsik [8] is presented, which concerns circular dichroism spectroscopic studies on the solution chemistry of M(II)-monensinates during their competition reactions. This is a perfect example of how spectroscopic techniques play a vital role in the characterization of novel metal complexes, and how metals influence reactions that may be useful in industry.

This Special Issue also contains articles concerning the significance of metal complexes in the present fight against biological infections. One study, led by Prof. Alessia Catalano [9], involves the use of Schiff bases formed using the azomethine group $\text{C}=\text{N}-$, where the substituents may be alkyl, aryl, or heterocyclic groups, as organic ligands for the building of metal complexes with antimicrobial activity and catalytic properties. The use of these compounds against bacterial species has been a research field of considerable interest for the scientific community over recent decades, and their development is continuously growing. Finally, the fifth article compiled in this Special Issue was written by me, together with Dr. Jimenez-Falcao, and concerns recent advances in metal complexes based on biomimetic and biocompatible organic ligands that can be used against Leishmaniasis infections [10]. Parasitic infections such as Leishmaniasis or Chagas disease are known as



Citation: Mendez-Arriaga, J.M. Recent Advances in Biological and Catalytic Applications of Metal Complexes. *Inorganics* **2024**, *12*, 249. <https://doi.org/10.3390/inorganics12090249>

Received: 27 August 2024

Accepted: 1 September 2024

Published: 13 September 2024



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neglected diseases due the lack of investment into the study of these kinds of maladies. Identifying novel and affordable drugs to combat tropical diseases is an urgent need, and the development of metal complexes is a promising route to achieve this objective.

I truly hope, as guest editor of the Special Issue Recent Advances in Biological and Catalytic Applications of Metal Complexes, that all readers of *Inorganics* can find information of interest and can become more familiar with the extraordinary potential and excellent results that metal complexes can provide to the fields of biology and catalysis.

Conflicts of Interest: The author declares no conflicts of interest.

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