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Editorial

Metal Complexes Diversity: Synthesis, Conformation, and Bioactivity

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Metal complexes remain central to modern inorganic chemistry due to their structural diversity [1,2] and relevance in various areas, including catalysis [3–5], medicine [6–11], bioinorganic systems [12–16], and supramolecular and materials science [17–20]. The contributions featured in this Special Issue of Inorganics, entitled "Metal Complexes Diversity: Synthesis, Conformation, and Bioactivity", demonstrate how ligand design and synthetic control can be strategically employed to tune molecular geometry, electronic features, and functional properties-factors crucial in determining the stability and activity of metal-based systems.

This Special Issue brings together nine contributions, including one comprehensive review article and eight original scientific papers, providing valuable insights into the synthesis, structure, and reactivity of metal complexes, as well as their conformational and biological properties. The review article by Kostova [21] provides a detailed overview of homo- and hetero-multinuclear iridium (III) complexes with significant cytotoxic activity, discussing their structural characteristics and biological potential as anticancer agents. This comprehensive contribution emphasizes how multinuclearity and the coordination environment affect their biological performance. The eight original scientific papers cover a wide range of topics and metals, showcasing both experimental and theoretical approaches:

- Ralić et al. [22] investigate the biological targets of a [Pd(dach)Cl_2] complex in HeLa cells, identifying proteins involved in ribosomal biogenesis and RNA splicing, thereby linking coordination chemistry with molecular biology.
- Jevtović et al. [23] present a theoretical study on the effects of coordination atoms (O/S/N) on the structure, stability, and protein/DNA binding of nickel (II) complexes with pyridoxal-semi-, thiosemi-, and isothiosemicarbazone ligands.
- Talebi et al. [24] describe the synthesis and structural characterization of a novel azide-bridged polymeric manganese (III) Schiff base complex derived from an allylamine-type ligand, revealing its unique structural and spectroscopic features.
- Nowak et al. [25] report on thionitrosyl complexes of rhenium (II) and technetium (II) with PPh_3 and chelating ligands, providing new insights into their reactivity and allowing new conclusions about similarities and differences in stability, reaction kinetics, and redox behavior between these 4d and 5d transition metals.
- Kovačević et al. [26] investigate ferrocene-based conjugates with hydrophobic amino acids, focusing on their conformational, electrochemical, and antioxidative properties, and highlight their relevance to bioorganometallic chemistry.
- Qiao et al. [27] examine NiFeSe complexes related to the active site of [NiFeSe]-hydrogenases, elucidate electronic and steric effects on oxygen reactivity, and clarify oxidative degradation mechanisms.

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- Sánchez López et al. [28] present the synthesis, properties, and electrochemistry of bis(iminophosphorane)pyridine iron (II) pincer complexes to enhance the understanding of pincer-type ligand systems.
- Petkov et al. [29] study di- and trinuclear iron (III) monensinates with different bridging motifs, combining spectral and computational analyses to reveal their structural diversity and bonding characteristics.

This Special Issue provides an integrated perspective on the diversity of metal complexes, emphasizing the importance of molecular design, structure–activity relationships, and interdisciplinary collaboration. The research presented here not only broadens our understanding of complex formation and reactivity, but also opens new pathways for applications in material development and medicinal chemistry.

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