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Light Responsive Material Based on Schiff Base Zn complexes

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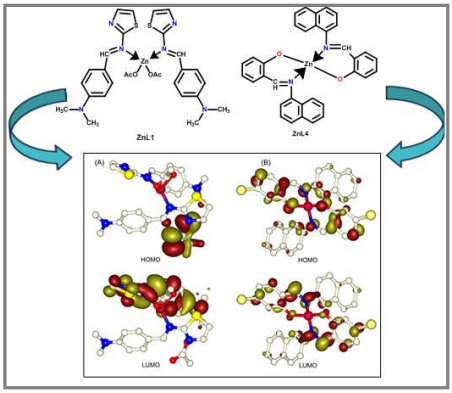
ABSTRACT

A series of novel Schiff base ligands were systematically synthesized through condensation reactions involving primary amines and benzaldehyde, utilizing molar ratios of 1:1 or 1:1.5. The resulting Schiff base ligands were comprehensively characterized employing various spectroscopic techniques, including 1H NMR, 13C NMR, UV-Vis spectroscopies, and elemental analysis. Subsequently, the coordination behavior of Zn(II) transition metal ions with these newly prepared Schiff base ligands was explored. The study identified imine ligand–containing transition metal complexes, particularly those involving zinc, as highly effective precursors for the synthesis of metal or metal chalcogenide nanoparticles. These synthesized complexes exhibited a versatile range of applications across diverse fields such as medicine, pharmacy, coordination chemistry, biological activities, industries, food packaging, dyes, polymers, and as O2 detectors. Additionally, the antioxidant activity of the Schiff bases was evaluated using DPPH, revealing a correlation between superior free-radical-scavenging activity and lower absorbance. Notably, one specific ligand, (E)-5-bromo-2-((naphthalen-2-ylimino)methyl) phenol (L4), demonstrated exceptional antioxidant activity with a percentage of 97.14%, as observed in the course of this study.

Graphical abstract:



Selected Kohn-Sham orbitals of optimized geometry of (A) ZnL1 and (B) ZnL4 using UB3LYP/6-31G** level of theory.

Keywords: Schiff base, Condensation, Absorption band, Metal Complex, Antioxidant activity.