

Thesis Title: "**Design and synthesis of novel fluorescent chemosensors for selective detection of different metal ions with applications in live cell imaging**"

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Abstract

Fluorescent chemosensors are very interdisciplinary due to its significance and applications in a variety of sectors, including chemistry, biology, medicine, and environmental studies, among others. The use of diverse chemosensors, especially fluorescence sensors, to distinguish between distinct metal ions or anions has enhanced molecular recognition technology in recent years. Many analytical devices are available to detect metal ions at very low concentrations (M to nM); however, these instruments are expensive and have limitations when it comes to real-time detection during field monitoring. This thesis combines a variety of Schiff base ligands which selectively detects distinct metal ions with their biological application.

Out of six chapters, **Chapter 1** represents a brief discussion regarding the significance of various metal ions, spectroscopic techniques: analytical approaches, fluorescence sensing mechanisms have been made. Furthermore a concise review has been provided on previously reported fluorescent to recognize different metal ions. **Chapter 2** includes two aza-phenol based macrocyclic probes have been designed for "CHEF-on" multi analytes sensing and study its application in biological cell imaging. **Chapter 3** contains design and synthesis of a hydrazinophthalazine derived chemosensor to detect metal ions Zn^{2+} , Al^{3+} via CHEF effect with theoretical calculation and biological application. **Chapter 4** represents a pyridoxal based bio-compatible fluorometric chemosensor for recognition of Zn^{2+} ion with theoretical calculation and live cell imaging. **Chapter 5** consists derivative of clove oil which used as chemosensor for colorimetric and fluorometric detection of Al^{3+} : crystal structure description and live cell imaging using MC3T3 cell line. **Chapter 6** covers the development and synthesis of euganol-sulfonyl based fluorescent probe for recognition of Al^{3+} and application in live cell imaging

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