

DOCTORAL THESIS

Cyclometalated iridium (III) complexes and their applications in the detection of biomarkers

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Abstract

Luminescent transition metal complexes have arisen as viable alternatives to organic dyes for sensory applications due to their notable advantages. This thesis aimed to synthesize different kinds of iridium(III) complexes, explore their interactions with DNAs and investigate their application for the construction of oligonucleotide-based sensing platforms for important biomarkers. A series of iridium(III) complexes incorporating a variety of C^N and N^N donor ligands were synthesized and were demonstrated to possess G-quadruplex-selective binding properties *via* emission titration, UV/vis titration, fluorescence resonance energy transfer melting and G-quadruplex fluorescent intercalator displacement experiments. These G-quadruplex-selective iridium(III) complexes were utilized as signal transducers to monitor the conformational changes of oligonucleotides in oligonucleotide-based luminescent detection platforms for protein tyrosine kinase-7 (PTK7), interferon-gamma (IFN- γ), sialic acid (Sia) binding immunoglobulin (Ig)-like lectin-5 (Siglec-5) and thymine DNA glycosylase (TDG). And these designed platforms could work effectively in the diluted cell extract as the results in this thesis indicated.

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