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Article

Histotoxicity of AIEgen Based on Triphenylamine for the Simultaneous and Discriminatory Sensing of Hg^{2+} and Ag^{+} Directly in Aqueous Media for Environmental Applications

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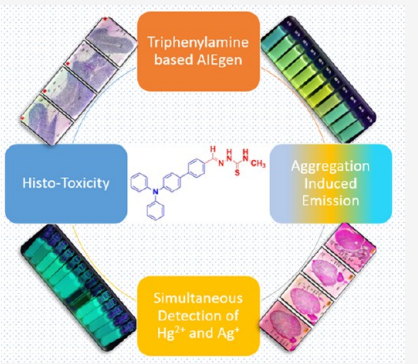
ABSTRACT: A newly synthesized AIEgen based on triphenylamine is fully characterized and coded as BRA for the simultaneous and discriminatory selective detection of Hg^{2+} and Ag^{+} ions directly in mixed aqueous media for the identification and purification of water with a low detection limit. Moreover, we employed BRA in histotoxicity in that when compared to the control group, fish exposed to the "novel synthesized luminogen (BRA)" that demonstrated photophysical phenomena during the "sensing of mercury and silver (heavy metals) in aqueous media" did not show any major distinguishing changes in the architecture of their gills, liver, muscle, brain, kidney, and heart tissues.



1. INTRODUCTION

Prof. B. Z. Tang and his team invented a new photophysical phenomenon known as aggregation-induced emission (AIE) in 2001, in which the mixture's water content affects how quickly weakened or nonemissive luminogens aggregate and become emissive. This conveys that aggregation-induced emission means that weak or nonemissive luminogens aggregate and become emissive.[1−3] AIE, on the other hand, exhibited normal solid-state luminescence behavior, and the fundamental cause of the transition from ACQ to AIE was a change in molecular packing from intense $\pi-\pi$ stacking to suppressed one. As a result, scientists began to focus on molecule packing rather than the chemical structure. Triphenylamine-based luminogens exhibit extraordinary photophysical phenomena such as aggregation-induced emission, solvatochromism, reversible mechanochromic, and so on, which have numerous uses.[4−6]

In recent years, potential applications of florescent organic luminogens having an aggregation-induced emission photophysical phenomenon in sensing have gained greater prominence due to their higher versatility and diversity in synthesis.[7] In context to this, a unique and novel organic compound with extraordinary photophysical phenomena was created via a straightforward Suzuki coupling reaction. The novel compound was observed to give promising results in sensing mercury and silver (heavy metals) in aqueous media. It also demonstrated aggregation-induced emissions and mechanochromic luminescence as its characteristic properties. The goal of the current experiment was to evaluate the toxicity of novel organic luminogen on the economically important Indian major carp *Catla catla*, by assessing how it affected the tissues of its critical organs, including the gills, liver, muscle, brain, kidney, and heart. Any major alterations observed in the normal architecture of vital tissues of fish in the "novel organic molecule"-treated groups were supposed to indicate the hazard susceptibility of that novel molecule.

Due to mining, oil refining, and the combustion of fossil fuels, mercury ions (Hg^{2+}) are extensively dispersed in the water, air, and soils. Organic mercury, such as methylmercury, can undergo microbial conversion to the inorganic mercury ions and elemental mercury ions in an environment, which enter the food chain and accumulate in the human body.[8,9] Hg^{2+} has a remarkable ability to interact with biological ligands in vivo, implying that an excess of Hg2+ in the body might cause major issues with the heart, stomach, kidneys, and brains, including the central nervous system, in a variety of irreversible disorders.[10,11] According to the WHO, Hg^{2+} levels in drinking

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