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Synthesis of a new β -naphthothiazole monomethine cyanine dye for the detection of DNA in aqueous solution

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Abstract

Novel monomethine cyanine dye (MC) derived from β -naphthothiazole and benzothiazole has been prepared and characterized by ^1H and ^{13}C NMR, FTIR, ESIMS, elemental analyses, absorption and fluorescence spectroscopy. The dye was conveniently synthesized by the condensation of two sulfate heterocyclic quaternary salts. The interaction between calf thymus DNA (ct-DNA) in tris(hydroxymethyl)aminomethane-HCl (Tris-HCl) aqueous buffer solution and MC has been studied with spectral fluorescence method. The binding constant value has been determined by fluorescence titration of MC with ct-DNA concentrations. The result obtained is consistent with an intercalative binding interaction between MC and ct-DNA. Compared with ethidium bromide (EB), MC showed a huge fluorescence enhancement upon mixing with ct-DNA.

Keywords: Monomethine cyanine dyes; Ethidium bromide; DNA; Naphthothiazole; Fluorescence enhancement; Intercalation

Article Outline