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 13C 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.

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