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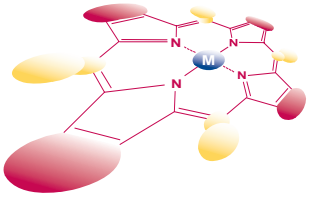

Photophysical, photochemical and bovine serum albumin binding studies on water-soluble gallium(III) phthalocyanine derivatives

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ABSTRACT: Spectral, photophysical, photochemical and bovine serum albumin binding studies on some gallium(III) derivatives - {1,(4)-(tetrapyridyloxyphthalocyaninato)gallium(III), (**αGaPc**); 2,(3)-(tetrapyridyloxyphthalocyaninato)gallium(III), (**βGaPc**); and their quaternized derivatives: **QαGaPc** and **QβGaPc**)} are hereby presented. β-Substituted complexes are more fluorescent, but show lower tendencies to undergo intersystem crossing than the α-substituted, as judged by their fluorescence and triplet quantum yield values. The quaternized derivatives (**QGaPc**) are water-soluble and non-aggregated, which makes them potential photosensitizers of choice for photodynamic therapy applications; these amphiphilic compounds also bind strongly to bovine serum albumin in 1:1 stoichiometries, and with binding constants (K_b) in the order of 10^6 M^{-1}. Copyright © 2007 Society of Porphyrins & Phthalocyanines.

KEYWORDS: photophysics, photochemistry, photodynamic therapy, bovine serum albumin, Stern-Volmer equation.

INTRODUCTION

Metallophthalocyanines (MPcs) show great prospects as phototherapeutic agents for the treatment of a variety of oncological and non-oncological diseases [1]. Photodynamic therapy (PDT) is based on the concept that a photosensitizer can be preferentially localized in malignant tissue, and subsequently, these photosensitizers can be activated with the appropriate wavelength of light to generate cytotoxic radical and non-radical derivatives of oxygen. MPc complexes exhibit a lot of promise as photosensitizers for photodynamic therapy (PDT) [2-7]. Their superior attributes, such as: red or near infra-red light absorption; non-toxicity, with low, skin photosensitizing potency; selective localization in tumors; efficient generation of singlet oxygen and appreciable fluorescence for visualization make them first-rate candidates for this purpose.

Complexation of phthalocyanines to closed-shell, diamagnetic ions such as Zn^{2+}, Al^{3+} and Si^{4+} imparts high triplet yields on the MPc complexes [8]. Gallium(III) phthalocyanine (GaPc) complexes are known [9-11], but photophysical and photochemical studies on these complexes are still limited. Tertiary butyl substituted GaPc and InPc derivatives have been investigated by Hanack and co-workers [10, 11] for their non-linear optical behavior. GaPc complexes, containing a heavier central metal, should give a higher triplet yield than their ZnPc, AlPc and SiPc counterparts, hence our interest in GaPc

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