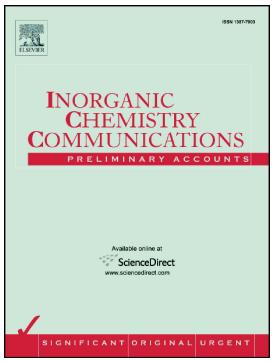

Synthesis, spectroscopy and singlet oxygen quantum yield of a non-aggregating hexadecamethyl-substituted phthalocyanine silicon(IV) derivative

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Title

Synthesis, Spectroscopy and Singlet Oxygen Quantum Yield of a Non-Aggregating Hexadecamethyl-substituted Phthalocyanine Silicon(IV) Derivative

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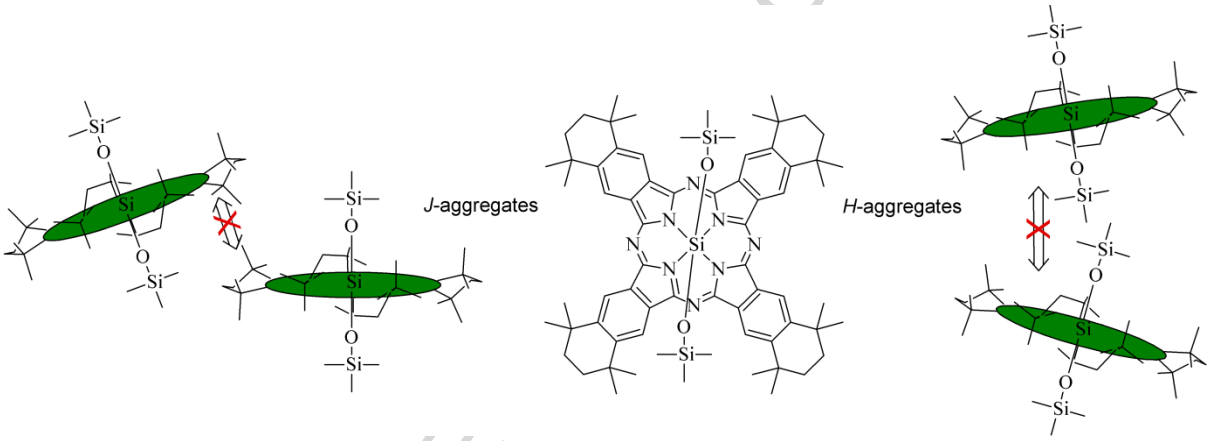
Graphical Abstract



Abstract

A rigid hexadecamethyl substituted phthalocyanine (Pc*) silicon(IV) dichloride was synthesized by template cyclization of corresponding 1,3-diiminoisoindoline derivative with $SiCl_4$. Attempts to prepare the same compound by insertion of $HSiCl_3$ into preformed H_2Pc* in the presence of bases were unsuccessful. Exchange of the axial chloride ligands with trimethylsiloxy groups made the molecular complex $Pc*Si(OTMS)_2$ very soluble and non-aggregating, as shown by UV-Vis experiments. The effect of such peripheral alkyl substitution on the singlet oxygen quantum yield of the $Pc*Si(OTMS)_2$ complex was determined and found to be 0.28; significantly lower than that for unsubstituted parent $PcSi(OTMS)_2$. The merit of improving solubility over reduced singlet oxygen quantum yields is discussed.

Keywords: silicon, phthalocyanine, singlet oxygen, photosensitiser

Photodynamic therapy is a well established method for the treatment of cancer that reduces unwanted side-effects by using light, typically tissue-penetrating IR-laser light, to activate a photosensitiser (PS) in a specific region where activity is desired[1]. Therapeutic activity is achieved by the excitation of triplet oxygen present in the cell to singlet oxygen, which then oxidizes the surrounding biomolecules; the effectiveness of a compound to do this is measured as its singlet oxygen quantum yield, Φ_Δ. Whereas the first generation of compounds consisted mainly of porphyrins, such as photofrin,