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Photophysicochemical behavior and antimicrobial properties of monocarboxy Mg (II) and Al (III) phthalocyanine-magnetite conjugates

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ABSTRACT

Asymmetric Mg (II) or Al (III) phthalocyanine (containing a COOH group and 3-pyridylsulfanyl units) was conjugated via an amide bond to amino functionalized magnetic nanoparticle (AIMN) to form MgPc-AIMN or AlPc-AIMN conjugate, and characterized. The photophysicochemical behaviour of the phthalocyanine–AIMN conjugates was investigated and compared to the asymmetric Pcs and to the simple mixture of Pc with AIMNs without a chemical bond, (MPc-AIMN (mixed)). The directed covalent linkage of AIMNs to the asymmetrical metallopthalocyanines afforded improvements in the singlet oxygen (Φ_Δ) and triplet state quantum yield (Φ_T) as well as singlet oxygen lifetimes for the MPcs–AIMN-linked conjugates compared to MPc-AIMN (mixed) and MPcs alone. The asymmetric phthalocyanines and their conjugates showed effective antimicrobial activity against *Escherichia coli* bacteria under illumination.

Keywords: asymmetric phthalocyanine, magnetite, nanoparticles, photodynamic antimicrobial chemotherapy (PACT), singlet oxygen.

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