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β-Substituted imidazopyridine ligands in tetraphenylporphyrins for therapeutical purposes

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Photosensitizer molecules are notorious to have diverse behaviors due to light absorption, including emissive decays such as fluorescence and phosphorescence or non-radiative processes like heat dissipation. Among these, porphyrins, a class of organic molecules, stand out due to their unique photophysical properties and versatility. Their applications range from dye-sensitized solar cells to medical treatments like photodynamic therapy (PDT), photothermal therapy (PTT), and photodynamic inactivation (PDI). An effective photosensitizer for PDT and PDI must hold key properties, especially a high triplet quantum yield and singlet oxygen generation, as those indicate the ability to generate the necessary cell damage. The former indicates efficient conversion from the singlet to longer-lived triplet excited state, while the latter is crucial for generating cytotoxic effects, leading to cell death. (1) Alternatively, PTT relies on molecules with a high internal conversion rate, causing cell death through heat dissipation. Looking for better suitable agents, an innovative family of neutral and cationic tetraphenylporphyrins with β-substituted imidazopyridine derivatives is chosen as study targets. These molecules have already revealed promising singlet oxygen generation and cytotoxic effects against *E. coli*, (2) emphasizing the relevance of understanding their photophysical properties. This work's main objective is to elucidate their electronic states and determine their radiative and non-radiative rates, particularly the intersystem crossing rate originated from the triplet quantum yield. Measuring this attribute entails great difficulty, for the triplet state presents no detectable signal, thus a meticulous technique is necessary. Therefore, a double pulse excitation method using a femtosecond laser centered at 515 nm is employed, resulting in two-fluorescence decay curves that can be analyzed to accurately determine the triplet quantum yield, (3) establishing potential applications.

Palavras-chave: Porphyrin; PDT; Spectroscopy.

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