Preface

Porphyrins are ubiquitous in nature, where they are essential for life. With simple synthetic modifications, nature is able to use porphyrinoids to perform functions that are completely different and difficult to realize, such as solar energy conversion or oxygen activation and transport. For this reason, these macrocycles have attracted the attention of researchers belonging to different disciplines, such as biomedicine, catalysts, photonics, molecular electronics, and sensors' development, with the aim to mimic these functions for practical applications.

Porphyrins are versatile playthings for organic chemists, owing to the possibility to transfer their peculiar properties from a single molecule to mesoscopic scale, achieving functional materials or novel therapeutic drugs.

While the complete coverage of porphyrinoid exploitations is not possible, considering the large area interested by these macrocycles, this second volume related to porphyrinoid chemistry of Topics in Heterocyclic Chemistry is focused on some examples of porphyrinoid application fields, presenting five contributions authored by leading researchers in the field.

The first chapter of this second volume is provided by Ravindra K. Pandey, with Shunqing Zhang and Nayan J. Patel. In the chapter the authors describe the recent developments of compounds as theranostic agents, able to perform both imaging (e.g., PET/fluorescence, MRI/fluorescence) and photodynamic therapy (PDT) functions.

The second chapter presents another promising application of porphyrinoids in the clinical field, reporting the development of boronated porphyrins and derivatives, as a class of highly promising third-generation boron delivery agents for boron neutron capture therapy (BNCT), a binary and highly localized form of treatment for brain tumors. This chapter is authored by N.V.S. Dinesh K. Bhupathiraju and M. Graça H. Vicente.

The third chapter moves to a different application field of porphyrinoids, and Claudio Goletti describes the results obtained by using the reflectance anisotropy spectroscopy (RAS) to characterize the optical anisotropy of thin and ultrathin porphyrin films. This technique, originally conceived for inorganic surfaces, can

be particularly useful to give unique information of porphyrin films, to be applied for optical sensing and photovoltaic applications.

Following this route, the next chapter reports several examples of LB and LS films of porphyrin derivatives both used for the realization of photovoltaic devices and for studying the charge transfer processes. The thin film deposition of dyes is in fact of paramount importance for the realization of photovoltaic devices, where porphyrinoids can mimic the role played in the biological systems. The chapter is authored by Simona Bettini, Ludovico Valli, and Gabriele Giancane.

In the last chapter Alessandro D'Urso, Maria Elena Fragalà, and Roberto Purrello report a complete overview of porphyrinoid–duplex DNA complexes. These supramolecular complexes are widely studied for their potential applications in different fields, ranging from biosensors to medicinal chemistry.

I hope that the two volumes dedicated to the porphyrinoids chemistry can allow the readers to appreciate the richness and the enormous potentialities of our beautiful macrocycles, which was my aim in editing these books. For this result, I should give my thanks to the chapter authors for their excellent contributions.

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