
Preface

This treatise pertains to dyes composed of a central polymethine moiety and two cyclic terminal subunits. The polymethine linker can be unsubstituted or substituted, and at least one terminal subunit is a heterocyclic system. The classes of compounds reviewed range from classical cyanines, first synthesized in the 1850s, to hemicyanines, to styryl dyes, to merocyanines, to coumarin polymethines, and to squarylium dyes that were synthesized for the first time in the 1960s. These structurally diverse classes of compounds have one common denominator, namely electron conjugation that involves the terminal heterocyclic/aromatic subunits and the central polymethine linker of the molecule. Such conjugated molecules show absorption and fluorescence that are a function of the structure of the three moieties. By changing the length and substitution of the polymethine linker and/or the structures of the terminal moieties, molecules can be designed with absorption and fluorescence ranging from the blue visible region (> 400 nm) to the near-infrared region (> 700 nm) of the electromagnetic spectrum. The synthetic developments of the last decade are reviewed and references to older but important work are provided to help design a dye of interest for a desired specific application. It is the fluorescence properties that are most important for a large array of modern applications of the dyes, especially in biotechnology. Some of the applications are clearly visible from the titles of the individual chapters, and additional features can be found upon inspection of the corresponding tables of contents. The subject index should be consulted for other properties and applications of the dyes that could not be elaborated on extensively in this relatively short review book. The authors took excellent care of such information by providing leading references on the additional subjects. I wish to thank the authors for their outstanding contributions. Thanks are also due to Ms. Birgit Kollmar-Thoni of Springer and Ms. Cornelia Gründer of le-tex publishing services oHG who effortlessly and with grace coordinated the technical aspects of the total project.

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