

SYNTHESIS OF NEW DERIVATIVES OF RHODANINE DYES FOR DYE-SENSITIZED SOLAR CELLS (DSSCs)

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Abstract

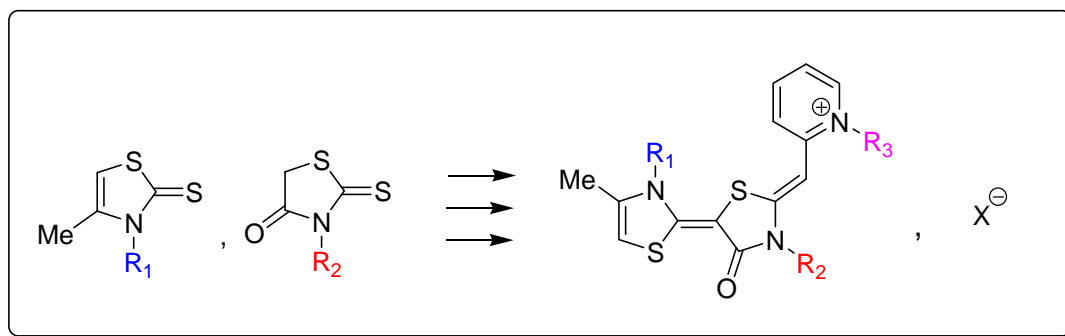
Solar energy is renewable energy par excellence. Environmentally friendly, it has many specific advantages because of the foreseeable depletion of fossil energy resources. The solar cells are currently dominated by silicon and expensive, hence the widespread enthusiasm of researchers interested in the possibility of manufacturing solar cells from plastic materials or organic.

These new cells have the advantage of being simpler and more malleable than those made from a silicon.[1]

Several organic dyes, such as styryl [2], coumarines [3], polyenes [4] and indole derivatives [5], have been proposed as potential candidates for solar cells.

Rhodanine derivatives, electron acceptors are used in a wide range of organic molecules "Push-Pull" These have applications in optics and more recently non linéaire [6] are used in the manufacture of DSSCs and [7] are obtained with a high conversion efficiency compared to other.[8]

We were interested in the synthesis of new chromophores containing the pattern rhodanine, a molecule from the leader aminothiazoline thione as a synthetic strategy developed previously in our laboratory.



Chromophores obtained and intermediate compounds were identified by spectroscopic methods (1H NMR, 13C, IR and mass spectrometry).

Keywords

DSSCs, Rhodanine, Merocyanine, Dye, Photovoltaic cells.

References

- [1]. Aberle, A.G. *Thin Solid Films* 2009, 517, 4706.
- [2]. Dentani T, Nagasaka K, Funabiki K, Jin JY, Yoshida T, Minoura H, et al 2008; 77 , 59–69.
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The authors of this paper

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Abstract:

The development of organic photovoltaic cells is a major challenge of the organic electronics industry. These organic photovoltaic cells are promising for energy production at low cost. They can be made on a flexible substrate, which will allow them to be easily integrated into mobile devices such as mobile phones, laptops

Research and development of solar cells based on organic materials or polymers is motivated by the advantages of these materials: low cost, unlimited raw material, ease of implementation, low temperature technologies, supermarkets, flexible devices ...

This would allow more to treat the same technology as the substrate (mechanical support), the active material occurs when the photovoltaic conversion and encapsulation.

The objective of this work was to develop new organic dyes, capable of capturing the photons in the region of the spectrum from red to near infrared. Various dyes derived from rhodanine and merocyanine were synthesized, characterized and their redox and optical properties studied.

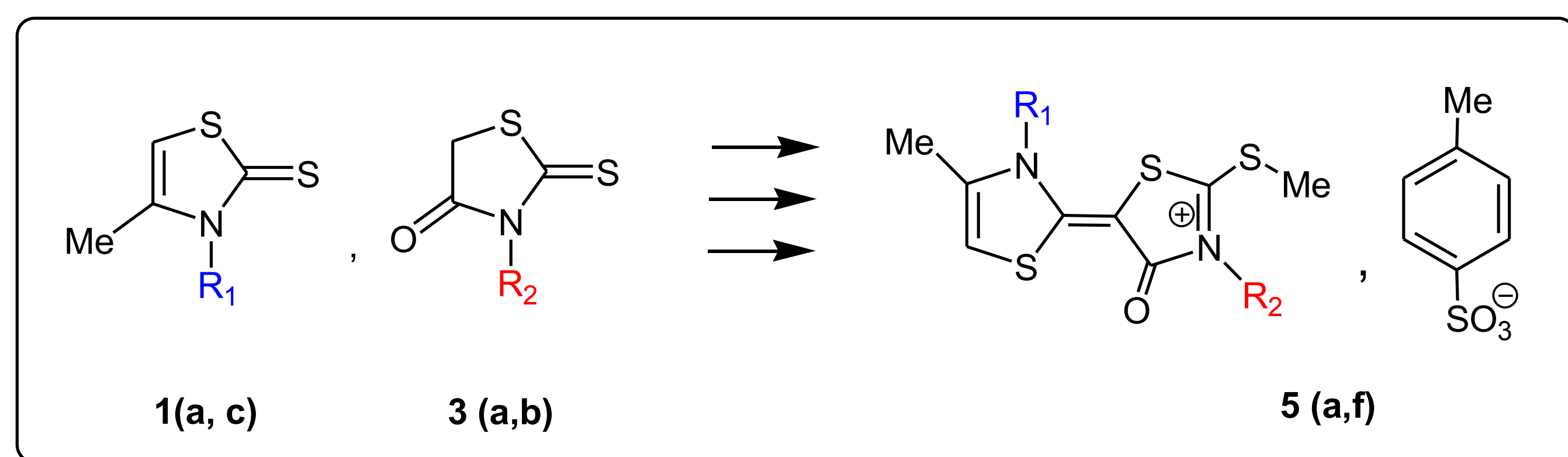
Introduction:

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Chromophores obtained and intermediate compounds were identified by spectroscopic methods (1H NMR, IR and mass spectrometry).

Results:

Table 1. Results of merocyanines 4 (a–f)

Compounds	Yields of 4 (%)	λ_{max} (nm)
4a	95	432
4b	88	428
4c	95	430
4d	70	436
4e	30	436
4f	60	431

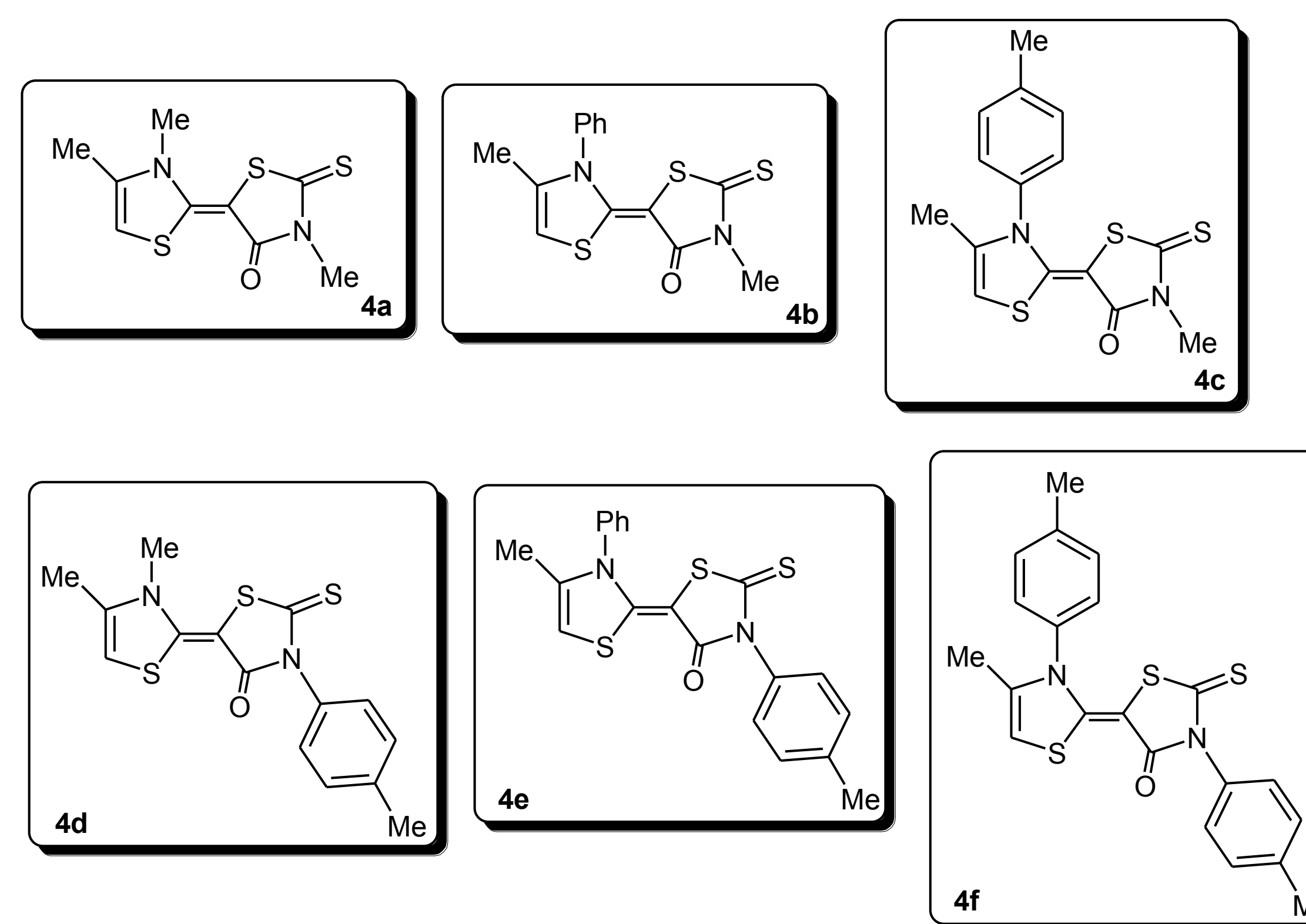
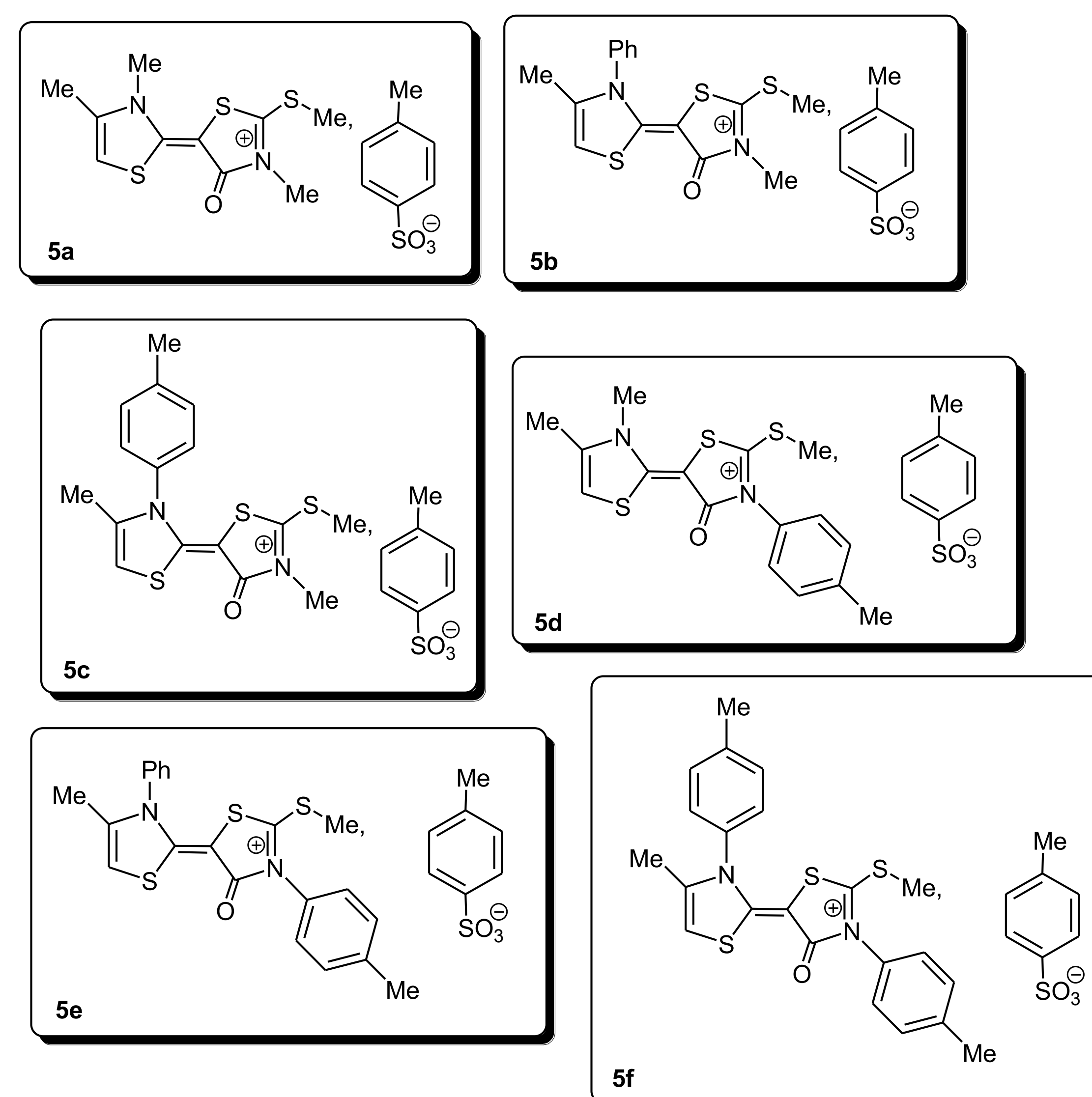


Table 2. Results of tosylates salts of merocyanines 5(a–f)

Compounds	Yields of 5 (%)	λ_{max} (nm)
5a	72	418
5b	82	422
5c	63	422
5d	92	420
5e	75	427
5f	66	432



Some molecules are characterized by spectroscopic methods (1H NMR, IR and mass spectrometry).

Conclusions:

The work presented in this manuscript are perfectly integrated into the research themes developed in the laboratory. They concern the synthesis of heterocycles involving rhodanine drifts photovoltaic interesting character.

This work allowed us initially, to a reminder of the family of cyanines natural and synthetic. We also reviewed the general methods of access to rhodanine and derivatives.

This study also successfully develop a series of reactions applied in organic synthesis. These reactions have in common the use of rhodanine as a source of starting material.

All syntheses based on rhodanine nucleus have easy access and using the two methods of heating (oil bath and microwave), several families of merocyanines and their corresponding salts.



Keywords:

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References:

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