Polycatenar mesogens derived from benzo[1,2-d:4,5d']bisthiazole.

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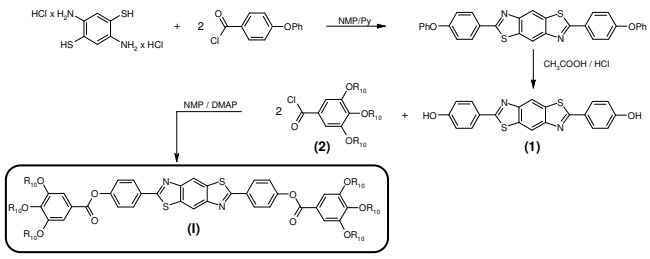
INTRODUCTION

Polycatenar liquid crystals have been known since 1985. They consist of a long rod-like rigid core ending in two half-disc moieties. The molecular architecture of such hybrid mesogens, situated between rod-like and disc-like mesogenic compounds, allows a rich polymesomorphism[1].
On the other hand, efficient light-emitting diode (LED) materials derived from heterocyclic benzobisazoles have been studied. An efficient π-stacking and strong intermolecular interaction were attributed to some novel physicochemical and mechanical properties observed in such materials[2].
In this work, new mesogenic polycatenar have been prepared, with the incorporation of benzo bisthiazole.

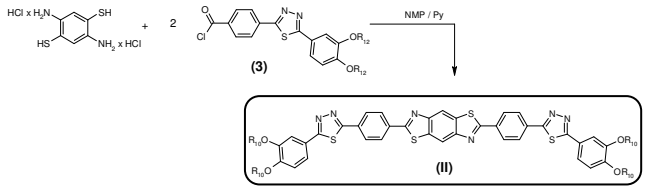
RESULTS AND DISCUSSION

The synthesis of tetracatenar and hexacatenar mesogen with 2,6-bisphenylbenzo[1,2-d:4,5d']bisthiazole as rigid central unit has been described in the scheme 1 and 2. The hexacatenar mesogen **(I)** has been obtained from esterification reaction between 2,6-bis(hidroxyphenyl)benzo[1,2-d:4,5d']bisthiazole **(1)** and 3,4,5-trisdecyloxybenzoyl chloride **(2)** in presence of DMAP which behaves as catalyst and base agent (scheme 1).



Scheme 1. Synthesis of bisthiazole mesogen **(I)** with ester group, [transition temperatures (º C): Cr 90 Col_x 132 I].

In the case of tetracatenar mesogen **(II)**, the preparation is based on coupling reaction between 2,5-diamino-1,4-benzenedithiol dihydrochloride and 4-[5-(3,4-bis(decyloxy)phenyl)-1,3,4-thiadiazol-2-yl]benzoyl chloride **(3)**, using pyridine as base agent (scheme 2).



Scheme 2. Synthesis of bisthiazole mesogen (II) with thiadiazole unit, [transition temperatures (º C): Cr 76 Col_x 97 I].

These products have shown thermotropic liquid crystalline properties with enantiotropic behavior. The columnar mesophase has been determined by textural observations using thermal microscopy under a polarizing optical microscope (Figure 1).

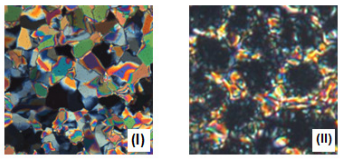


Figure 1. Optical micrographs (magnification: x20) **I)** Columnar phase at 100 ºC of hexacatenar mesogen with function ester, and **II)** Columnar phase at 92 ºC of tetracatenar mesogen with thiadiazole unit.

The columnar phase in these materials is explained by some self-assembled molecules generating disc-shaped aggregates. The self organization of these aggregates exhibit columnar structure due to π-stacking effect between rigid central units of 2,6-bisphenylbenzo[1,2-d:4,5d']bisthiazole.

CONCLUSION

The molecular design proposed and obtained through the synthesis described in this work has been a success, allowing to reach new polycatenar liquid crystals based on 2,6-bisphenylbenzo[1,2-d:4,5d']bisthiazole unit.

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