PÔSTER - RESUMO - MATERIAIS E BIOMATERIAIS

SYNTHESIS OF PYRIDINE-BASED LUMINESCENT DISCOTIC LIQUID CRYSTALS VIA THE HANTZSCH REACTION

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Luminescent discotic liquid crystals have attracted significant attention in recent years due to their potential application in Organic Light-Emitting Diodes (OLEDs), as their ability to self-organize and exhibit anisotropic emission can contribute to enhanced light outcoupling efficiency in devices. These materials combine optical and structural properties that make them particularly attractive for optoelectronic applications. However, for practical applications, they must simultaneously display efficient luminescence and liquid-crystalline behavior near room temperature, a characteristic that can be promoted by reducing molecular symmetry and properly tuning intermolecular interactions [1]. In this context, it becomes essential to understand how structural modifications influence the thermal, photophysical, and mesomorphic properties of these systems. Thus, five structures derived from the 2,4,6-triphenylpyridine core were designed and synthesized using the multicomponent Hantzsch methodology [2], an efficient synthetic strategy for obtaining less symmetrical pyridines. The molecules were designed with varying numbers and positions of aliphatic chains to promote symmetry reduction, modulate molecular packing, and evaluate the impact of these structural variations on mesophase stabilization. Additionally, the influence of the pyridine ring on the material properties was analyzed through comparison with analogous molecules

containing benzene or 1,3,5-triazine as the central unit [3]. The presence of nitrogen atoms in the pyridine core can reduce steric hindrance and promote greater structural planarity, directly influencing molecular packing and, consequently, the thermal and optical properties. The proposed molecules were successfully synthesized and characterized. Moreover, the synthetic route reported in the literature was optimized using microwave-assisted heating, resulting in improved synthetic efficiency. Absorption and emission spectroscopy studies in the UV–Vis region revealed luminescent behavior, with emission bands between 313 and 395 nm. Among the analyzed structures, molecule N-322, bearing seven long aliphatic chains, exhibited columnar mesomorphism in the temperature range of 30–50 °C. This behavior represents a favorable indication of the potential application of these molecules and motivates the expansion of the structural scope proposed in this project.

References:

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Palavras-chave: liquid crystals; pyridine; hantzsch synthesis; organic electronics; discotic materials.