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# Self-assembling of Novel Ionic Liquid Crystals Based on Substituted Pyridinium Cations

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## PURPOSE OF THE ABSTRACT

Ionic liquid crystals are soft ordered materials containing cations and anions scaffolds. As they combine characteristics of both liquid crystals and ionic liquids, it is possible to tune their physicochemical and self-assembling properties by selecting specific moieties, allowing the design of new functional and responsive materials [1]. It is known that the rigidity of the cation linked to the flexibility of the alkyl moiety are main requirements for the formation of ionic liquid crystals [2]. Therefore, in this work, several pyridinium bromide derivatives were synthesized based on pyridinium and regioisomeric methylpyridinium cations substituted with a dodecyl chain, [C12Pyr][Br] and [C12-n-Pic][Br] (n = 2, 3 and 4). Moreover, two synthetic methodologies were compared: the conventional heating and a microwave approach. The latter revealed to be a greener alternative, reducing the reaction time, the solvent usage and improving their yields. All compounds were characterized by spectroscopic techniques (1H and 13C-NMR; ATR-FTIR), Differential Scanning Calorimetry, Polarized Optical Microscopy and X-Ray Powder Diffraction. The spectroscopic characterization indicated the formation of thermally induced smectic phases with a layer spacing between 20 and 35 Å, compatible with a bilayer interdigitated or tilted lamellar arrangement of the cation's alkyl chain. The insertion of a methyl group in meta or para positions of the pyridinium ring significantly decreases the clearing point and the liquid crystalline range, when compared with the parent [C12Pyr][Br] and the ortho-substituted. Furthermore, lyotropic aqueous solutions of [C12-2-Pic][Br] were also investigated. In general, this work indicates new routes for preparing ionic liquid crystals capable of being functionalized through the synthesis design.

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## FIGURES

FIGURE 1

FIGURE 2


## KEYWORDS

Ionic Liquid Crystals | Dodecyl Methylpyridinium Salts | Smectic Liquid Crystals | Lyotropic Liquid Crystals


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