Polar crystalline materials derived from bent-core molecules

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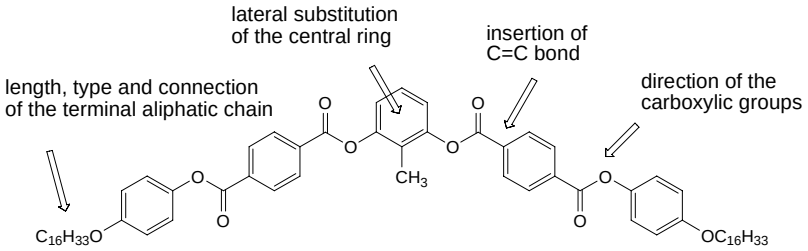
Polar crystalline materials are of topic interest due to their ferro-electric/pyroelectric properties. Organic single-component ferroelectrics are very rare and have been found by chance only (1). On the base of bent-core molecules a new design strategy was developed to obtain organic crystals with polar properties. The starting compound which is not liquid crystalline is shown in the scheme. Ferroelectric behaviour was found in the CrIII phase (2, 3). Now, five-ring bent-core molecules have been synthesized which do not form liquid crystalline phases, however, which show a polar arrangement in the crystalline state.



By change of the direction of the carboxylic connection groups as well as by increasing the bent core (insertion of C=C bonds), liquid crystalline compounds have been obtained, which are not helpful for our goal. Chemical variation of the wing groups and selected patterns of lateral substitution, respectively, can result in crystalline materials exhibiting ferroelectric and/or pyroelectric behaviour. The physical properties have been proved by DSC, X-ray, electrooptical and SHG measurements.

References:
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