SYNTHESIS OF CARBOXYLIC ACID DERIVATIVES USING A SOLID SUPPORTED CARBODIIMIDE, Jeffrey R. Fishpaugh, Maciej Adamczyk and Phillip G. Mattingly, D-9NM, Abbott Laboratories, Abbott Park, IL 60064

The use of solid supported syntheses in organic chemistry has grown in the last five years with the advent of combinatorial chemistry and availability of new resins. Solid supported syntheses have long been employed in biochemical syntheses, such as the Merrifield synthesis of peptides and automated synthesis of oligonucleotides. These biphasic syntheses have the advantage of readily removing all undesired materials to afford the product in high yield and purity.

We present herein the use of solid supported EDAC [ethyl 3-(dimethylamino)-propylcarbodiimide] for the synthesis of different carboxylic acid derivatives such as active esters, thiolesters, optically active amides and esters. This method offers the convenience of solid supported synthesis to produce the desired materials in high yield and high purity.

ENANTIOMORPHOUS IMAGES FROM ENANTIOMERIC MOLECULES BY STM. David M. Walba, Forrest Stevens and Daniel J. Dyer, Department of Chemistry and Biochemistry, University of Colorado, Boulder, Colorado 80309-0215

Two-dimensional heteroepitaxial crystals of several chiral ferroelectric liquid crystal (FLC) molecules on graphite have been observed at molecular resolution by scanning tunneling microscopy (STM). In one case, enantiomeric FLCs reproducibly gave 2-D crystals exhibiting enantiomorphous images. In addition, when a racemate of the same material on graphite was studied by STM, a conglomerate of heterochiral 2-D images with well-defined domain walls separating heterochiral regions was observed. These enantiomorphous images are indistinguishable by autocorrelation analysis from images obtained from the enantiomerically pure materials, suggesting that the heterochiral images indeed derive from heterochiral crystals of a 2-D conglomerate.


We have previously developed solution and solid-phase methods to prepare sequence-specific oligomers derived from combinations of ortho-, meta-, and para-phenylacetylene monomers (J. Am. Chem. Soc. 1994, 116, 10841-42, and references therein). Many of these oligomers can be cyclized into macrocycles of various size and shape. Here we describe an alternative that is realized by the elaboration of monomers into polymeric or oligomeric chains. The ordered sequence of monomers can serve as the repeating motif of helical structures whose internal shape resembles that of the corresponding macrocycle. In order to promote the development of helical conformations, several approaches are being pursued including donor-acceptor induced aromatic stacking and hydrophobic effects. Calculations of modest size oligomers show stable helical conformations with as few as 8 monomer units. Experimental studies of oligomers composed of 9 and 13 monomer units reveal the spontaneous formation of birefringent circular strands (5 - 10 microns thick and up to 200 microns long) upon cooling from a homogeneous chloroform solution.

CHIRAL NANOMETER-SIZED STRUCTURES. R.J.M. Nolte, Department of Organic Chemistry, NSR-Center, University of Nijmegen, 6525 ED Nijmegen, The Netherlands

Ultralarge molecules and assemblies of molecules with dimensions in the range of 5 to 500 nm and molecular weights of $10^4$ to $10^6$ Daltons are currently receiving great interest. For these structures - called nanostructures - many applications can be foreseen, e.g. in the fields of catalysis and materials science. Developing strategies for their design is one of the challenges in modern chemistry. Our efforts to construct chiral nanostructures from different optically active building blocks will be discussed. It will be shown that the morphology of the chiral structures can be tuned by changing the pH or by complexation of metal ions.