

Side Chain Liquid Crystal Polymers (SCLCPs)

Terminally Attached

Polymer backbone

Spacer unit

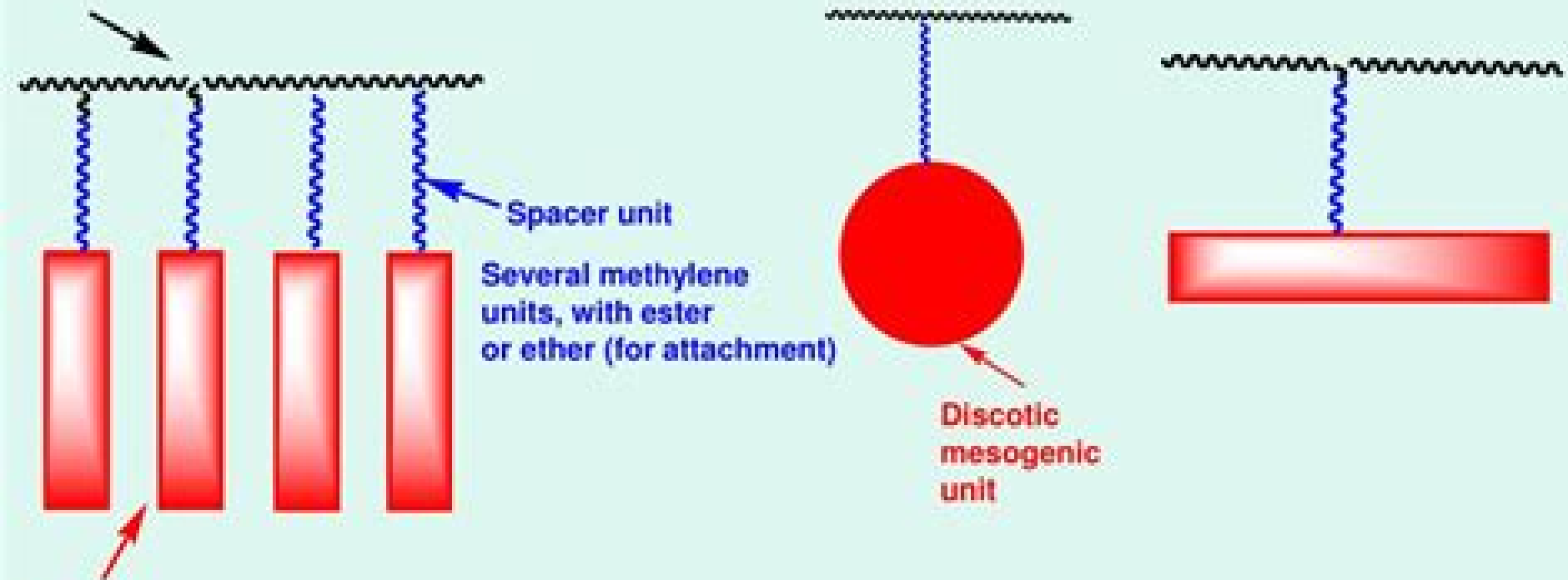
Several methylene units, with ester or ether (for attachment)

Calamitic mesogenic unit

Laterally Attached

Discotic mesogenic unit

A general template for side chain liquid crystal polymers



Side Chain Liquid Crystal Polymers

D. Coates



Side Chain Liquid Crystal Polymers:

Side Chain Liquid Crystal Polymers C.B. McArdle, 1990-04-30

Theoretical Predictions for Side-chain

Liquid-crystal Polymers and Comparison to Experiment, 1988 This paper presents results from a new unique microscopic molecular theory for side chain liquid crystalline polymers LCPs in the nematic N and multiple smectic A SA LC phases and the isotropic I liquid phase There are no ad hoc or arbitrarily adjustable parameters in this theory The agreement between the theoretical and experimental values for various properties including transition temperatures and quadratic characteristic radii is very good relative deviations between 0% and less than 6 2% The theoretical results also show for the first time that the N and I phases for these LCPs involve the packing of plate like sections of backbones and side chains and that the local bilayer SA phase involves packing of side chains within a plate like section This type of packing is predicted to be typical for side chain LCPs This theory can predict for the first time whether the side chains of a molecule pack on the same or alternating opposite sides of the backbone and whether side chains on different molecules interdigitate overlap with each other 13 refs 1 fig 4 tabs

Liquid Crystalline Polymers Xin-jiu Wang, Qi-feng Zhou, 2004-04-14 This textbook consists of six chapters The first chapter highlights the concept of liquid crystals including chemical structure phase classification defect and texture and continuum theory It has been carefully written to meet the needs of readers who do not specialize in liquid crystals The second chapter is related to the theoretical description of liquid crystalline polymers networks and gels which deals with subjects such as the formation of liquid crystallinity in the polymer system the phase transition and phase diagram the molecular weight effect chain conformation physics properties etc In Chapter 3 the molecular engineering of liquid crystalline polymers is introduced The molecular composition and the molecular weight play essential roles in the molecular design which are reviewed in detail In addition some unusual liquid crystalline polymers are discussed Chapter 4 is devoted to the phase identification of liquid crystalline polymers The techniques involved cover polarizing microscopy thermal analysis X ray diffraction and other areas Chapters 5 and 6 summarize the properties and applications of liquid crystalline polymers Chapter 5 deals mainly with mechanical performance in fiber and composites Chapter 6 presents the elasticity viscosity and rheology of liquid crystalline polymers as well as other important properties

Synthesis of Side Chain Liquid Crystal Polymers by Living Ring Opening Metathesis Polymerization. 4. Synthesis of Amorphous and Side Chain Liquid Crystal AB Block Copolymers, 1992 Diblock copolymers with well defined block length yield ordered phase separation Morphology of the microphase separation is controllable by varying the weight ratio of the two blocks and the length of each block If one of the blocks is a side chain liquid crystalline polymer SCLCP microphase separated systems with liquid crystalline microphases may be realized Such systems are of fundamental as well as practical interest The effect of size and type of the liquid crystalline microphase transition is one of the fundamental questions This effect is recently investigated by the polymer system in which low molecular weight liquid crystals are dispersed Different

from the low molecular weight liquid crystals dispersed systems the block copolymer can give several types of microdomains lamellae cylinders or spheres Structure-property Relationships in Side Chain Liquid Crystal Polymers Aileen A.

Craig,1996 *Liquid Crystalline Polymers* A. M. Donald,A. H. Windle,S. Hanna,2006-05-11 A 2006 edition explaining the underlying science and applications of liquid crystalline polymers **Polarized Light in Liquid Crystals and Polymers**

Toralf Scharf,2007-01-02 **Polarized Light in Liquid Crystals and Polymers** deals with the linear optics of birefringent materials such as liquid crystals and polymers and surveys light propagation in such media with special attention to applications It is unique in treating light propagation in micro and nanostructured birefringent optical elements such as lenses and gratings composed of birefringent materials as well as the spatial varying anisotropic structures often found in miniaturized liquid crystal devices **Liquid Crystals** Shri Singh,David A. Dunmur,2002 Liquid crystals are partially ordered systems without a rigid long range structure The study of these materials covers a wide area chemical structure physical properties and technical applications Due to their dual nature anisotropic physical properties of solids and rheological behavior of liquids and easy response to externally applied electric magnetic optical and surface fields liquid crystals are of greatest potential for scientific and technological applications The subject has come of age and has achieved the status of being a very exciting interdisciplinary field of scientific and industrial research This book is an outgrowth of the enormous advances made during the last three decades in both our understanding of liquid crystals and our ability to use them in applications It presents a systematic self contained and up to date overview of the structure and properties of liquid crystals It will be of great value to graduates and research workers in condensed matter physics chemical physics biology materials science chemical and electrical engineering and technology from a materials science and physics viewpoint of liquid crystals **The Synthesis and Evaluation of Side Chain Liquid Crystal Polymers** Philip James Smith,1993

Synthesis of Novel Side Chain Liquid Crystal Polymers Paul Rostron,1996 **Synthesis of Side Chain Liquid Crystal Polymers by Living Ring Opening Metathesis Polymerization. 1. Influence of Molecular Weight, Polydispersity, and Flexible Spacer Length (n** ,1992 The living ring opening metathesis polymerization of 5 carbo n 4 methoxy 4 biphenyl oxy alkyl bicyclo 2 2 1 hept 2 ene 1 n n 2 8 by Mo CH t Bu NAr 0 t Bu 2 Ar 2 6 C6H3 t Pr2 is described Polymers with degrees of polymerization from 5 to 100 and narrow molecular weight distributions Mw Mn 1 05 1 24 were obtained in high yield All polymers exhibit an enantiomorphic nematic mesophase Glass transition and isotropization temperatures increase with increasing molecular weight and become independent at approximately 30 50 repeat units The change in enthalpy of isotropization is relatively independent of molecular weight Using polymer blends it was shown that polydispersity has no effect on either the transition temperatures or the temperature range of isotropization Isotropization alternates in an odd even manner up to spacer lengths of n 6 and then levels off Living ring opening metathesis polymerization Side chain liquid crystalline polymers SCLCPs Liquid Crystal Polymers D. Coates,2000 Liquid crystal

polymers LCPs have a wide range of uses from strong engineering plastics to delicate gels for use in liquid crystal LC displays For this reason it is essential reading for materials scientists engineers or technologists in industry as well as research laboratories or academia An additional indexed section containing several hundred abstracts from the Rapra Polymer Library database gives useful references for further reading

Synthesis of Side-chain Liquid Crystal Polymers by Cyclopolymerisation Peter Buxton,1998 *Liquid Crystal Polymers: From Structures to Applications* A.A. Collyer,2012-12-06 The subject of liquid crystals and their use in electronic displays and in non linear optical systems has become of tremendous importance during the last decade and the incorporation of liquid crystal units into polymeric materials has led to a group of new materials with diverse properties Some of these properties have been utilized in new products and some have yet to be used Much published work has appeared that deals with specific materials or particular applications and it was felt that a book was needed to examine and explain the underlying principles governing the diverse properties of these liquid crystal polymers LCPs The current work describes the diverse nature of LCPs their synthesis characterization properties and finally their applications It describes the manner in which liquid crystallinity or mesomorphism occurs in small molecules monomer liquid crystals and polymer liquid crystals Chapter 1 gives a classification of the various ways in which the meso gens may be connected to the polymer chains Currently the bulk of LCP material is based on main chain or longitudinal LCPs for use in engineering applications The side chain or comb polymers are intended for use in electronics and opto electronic systems and as surfactants Many other variants and possibilities exist but their properties have not yet been fully studied or used In this respect it is hoped that the current work will indicate future possibilities as well as discussing current opinion v Preface vi Chapters 2 and 3 describe methods of characterizing the mesophases *Electro-optic Phenomena in Side-chain Liquid Crystal Polymers* Khalid Hassan Bader Al-Ammar,1991

Liquid Crystals Gregory Philip Crawford,2007 1 Liquid crystals a unique phase of matter 2 Medical displays 3 Liquid crystals in spectroscopy microscopy and hyperspectral imaging 4 Liquid crystal biosensors 5 Liquid crystal lasers 6 Biomimicking with liquid crystals 7 Actuators and delivery systems [The Synthesis and Characterisation of Laterally Attached Side Chain Liquid Crystal Polymers](#) Eric A. Whale,1993 [Liquid Crystalline Polymers](#) Vijay Kumar Thakur,Michael R. Kessler,2015-11-16 This book introduces anisotropic innovations in liquid crystalline polymers as well as new nanocomposite materials and testing techniques The authors detail the newest discoveries of material properties material types and phases and material characterization This interdisciplinary work creates valuable links that strengthen the approach to the evolving field of liquid crystalline polymers materials

Synthesis and Structural Studies of Side-chain Liquid Crystal Polymers and Elastomers Andrew J. Symons,1993 **Ferroelectric Polymers** Hari Singh Nalwa,1995-06-20 This work covers the chemistry and physics of polymeric materials and their uses in the fields of electronics photonics and biomedical engineering It discusses the relationship between polymeric supermolecular structures

and ferroelectric piezoelectric and pyroelectric properties

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