

1. Record Nr.	UNINA9910828850303321
Titolo	Biaxial nematic liquid crystals : theory, simulation, and experiment // edited by Geoffrey R. Luckhurst and Timothy J. Sluckin
Pubbl/distr/stampa	Chichester, England : , : Wiley, , 2015 ©2015
ISBN	1-118-69635-2 1-118-69631-X 1-118-69633-6
Descrizione fisica	1 online resource (424 p.)
Disciplina	530.4/29
Soggetti	Nematic liquid crystals Liquid crystals - Spectra Liquid crystals - Research
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Includes index.
Nota di bibliografia	Includes bibliographical references at the end of each chapters and index.
Nota di contenuto	Cover; Contents; About the Editors; List of Contributors; Preface; Chapter 1 Introduction; 1.1 Historical Background; 1.2 Freiser Theory; 1.3 Nematic Order Parameters; 1.4 Nematic Tensor Order Parameters; 1.5 Theoretical Phase Diagrams; 1.6 Landau-de Gennes Theory; 1.7 Computer Simulation; 1.8 Other Theoretical Issues; 1.9 Applications; 1.10 Characterisation; 1.11 Lyotropic and Colloidal Systems; 1.12 Molecular Design; References; Chapter 2 Biaxial Nematics: Order Parameters and Distribution Functions; 2.1 Introduction; 2.2 The Cartesian Language; 2.2.1 Order Parameters 2.2.2 Molecular Symmetry 2.2.3 Measurement; 2.3 The Spherical Tensor Language; 2.3.1 The Order Parameters of Biaxial Molecules in a Uniaxial Phase; 2.3.2 Molecular Symmetry; 2.3.3 Measurement; 2.4 Extension to Biaxial Nematics; 2.4.1 Orientational Order Parameters; 2.4.2 Systems with D _{2h} Point Group Symmetry; 2.4.3 Measurement of the Order Parameters; 2.4.4 Systems with C _{2h} Point Group Symmetry and Their Order Parameters; 2.4.5 Systems with C _{2h} Point Group Symmetry: The Cartesian Language; 2.5 Fourth-Rank Order Parameters;

2.6 The Singlet Orientational Distribution Function; 2.7 Appendices
2.7.1 Point Group Symmetry and the Associated Symmetry Operations
2.7.2 Legendre Polynomials, Modified Spherical Harmonics and Wigner
Rotation Matrices; Acknowledgements; References; Chapter 3 Molecular
Field Theory; 3.1 Introduction; 3.2 General Mathematical Theory; 3.2.1
Two-Particle Hamiltonian; 3.2.2 Ensemble Potentials; 3.2.3 Molecular
Field Approximation; 3.2.4 Variational Principles; 3.2.5 Local Stability
Criterion; 3.3 Non-Polar Molecules; 3.3.1 Quadrupolar Hamiltonians;
3.3.2 Phase Transitions; 3.3.3 Universal Phase Diagram; 3.3.4 Steric
Effects; 3.4 Polar Molecules
3.4.1 Dipolar Fluids
3.4.2 Dipolar Hamiltonian; 3.4.3 Condensed Polar
Phases; References; Chapter 4 Hard Particle Theories; 4.1 Introduction;
4.2 Theoretical Approaches; 4.3 Board-Like Models; 4.4 Bent-Core
Models; 4.5 Rod-Plate Mixtures; 4.6 Conclusions and Speculations;
Acknowledgements; References; Chapter 5 Landau Theory of Nematic
Phases; 5.1 Introduction; 5.2 Symmetry of Biaxial Nematics and Primary
Order Parameters; 5.3 Landau Expansion; 5.3.1 Generic NU-I Phase
Transition; 5.3.2 Generic NB-NU and NB-I Phase Transitions; 5.3.3 Role
of Coupling between Nematic Order Parameters
5.3.4 Landau-de Gennes Expansion in Terms of the Alignment
Tensor
5.4 Conclusion; Acknowledgements; References; Chapter 6
Computer Simulations of Biaxial Nematics; 6.1 Introduction; 6.2 Order
Parameters; 6.3 Model Potentials and Applications; 6.3.1 Lattice
Models; 6.3.2 Atomistic Models; 6.3.3 Molecular Models; 6.4
Conclusion; Acknowledgements; 6.5 Appendices; 6.5.1 Quaternions;
6.5.2 Angular Momentum Operator; 6.5.3 Kinematic and Dynamic
Equations of Rotational Motion; 6.5.4 Propagator/Integrator of
Rotational Equations of Motion; 6.5.5 Gradient of the Biaxial Gay-Berne
Potential
6.5.6 Torques of the Biaxial Gay-Berne Potential

Sommario/riassunto

Liquid Crystals are a state of matter that have properties between those of conventional liquid and those of a solid crystal. Thermotropic liquid crystals react to changes in temperature or, in some cases, pressure. The reaction of lyotropic liquid crystals, which are used in the manufacture of soaps and detergents, depends on the type of solvent they are mixed with. Since the accidental discovery of the chiral nematic (ordered) phase in 1888 many liquid crystal phases have been found, sometimes by chance and sometimes by design. The existence of one such phase was predicted by Freiser in 197
