

Topics in Fluorescence Spectroscopy

Volume 7

DNA Technology

Topics in Fluorescence Spectroscopy

Edited by JOSEPH R. LAKOWICZ

Volume 1: Techniques

Volume 2: Principles

Volume 3: Biochemical Applications

Volume 4: Probe Design and Chemical Sensing

Volume 5: Nonlinear and Two-Photon-Induced Fluorescence

Volume 6: Protein Fluorescence

Volume 7: DNA Technology

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Edited by

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Preface

During the past fifteen years, DNA technology has advanced at an astounding pace. The pioneering papers on the use of fluorescence in sequencing appeared in 1986–1987, resulting in publication of the human genome sequence in February of 2001. Fluorescence detection has played a dominant role not only in sequencing, but in genetics research and diagnostics. In addition to sequencing, fluorescence is used in essentially all measurements of DNA amplification by PCR and other methods. Molecular beacons are used to light up specific sequences in mixtures of DNA, even at the intracellular level. In the past several years, DNA arrays or gene chips have become an important research tool in developmental biology, and drug discovery, and targeted treatments. It is now possible to place an excess of 30,000 DNA sequences on a single microscope slide, and to identify the amounts of complimentary DNA by fluorescence ratiometric measurements. In this volume, we attempted to provide an overview of the fundamental principles associated with these modern applications of fluorescence to nucleic acids. Because of the rapid rate of development in this field, it is not possible for any volume to be completely up to date on the latest details. Hopefully the fundamental principles will remain useful to scientists using modern DNA methodology.

Joseph R. Lakowicz
Center for Fluorescence Spectroscopy
March 2002

Contents

1. DNA Sequencing Using Fluorescence Detection

Steven A. Soper, Clyde Owens, Suzanne Lassiter, Yichuan Xu,
and Emanuel Waddell

1.1. General Considerations	1
1.1.1. What Is DNA?	1
1.1.1.1. Organization of Genome	1
1.1.1.2. Functions of Genes	2
1.1.2. What Is DNA Sequencing?	2
1.1.2.1. DNA Sequencing Factories	2
1.1.3. Structure of DNA	5
1.1.3.1. Nucleotide Bases	5
1.1.3.2. Watson–Crick Base Pairing	5
1.1.4. Methods for Determining the Primary Structure of DNA	6
1.1.4.1. Maxam–Gilbert Sequencing	7
1.1.4.2. Sanger Chain Termination Method	10
1.1.5. Modes of Electrophoresis	10
1.1.5.1. Slab Gel Electrophoresis	14
1.1.5.2. Capillary Gel Electrophoresis	15
1.1.6. Detection Methods for DNA Sequencing	16
1.1.6.1. Autoradiographic Detection	16
1.1.6.2. Fluorescence Detection	16
1.2. Fluorescent Dyes for DNA Labeling and Sequencing	21
1.2.1. Visible Fluorescence Dyes for DNA Labeling	24
1.2.2. ET Dyes for DNA Sequencing	30
1.2.3. Near-Infrared Dyes for DNA Sequencing	32
1.3. Instrumental Formats for Fluorescence Detection in DNA Sequencing	34
1.3.1. Fluorescence Scanning Instruments	36
1.3.2. Fluorescence Imaging Systems for DNA Sequencing ...	37
1.4. Dye Primer/Terminator Chemistry and Fluorescence Detection Formats	40
1.4.1. Single Color/Four Lane	43
1.4.2. Single Color/Single Lane	45
1.4.3. Two Color/Single Lane	47
1.4.4. Four Color/Single Lane	50

1.4.5. So Which Sequencing Format It Better?	51
1.4.6. Single Color/Four Lifetime Sequencing	54
1.5. Single Molecule DNA Sequencing Using Fluorescence	
Detection	59
References	65

2. Fluorescence in Nucleic Acid Hybridization Assays

Larry E. Morrison

2.1. Introduction	69
2.1.1. Heterogeneous Versus Homogeneous Hybridization	
Assays	70
2.1.2. Amplified Hybridization Assays	71
2.2. Heterogeneous Hybridization Assays	72
2.2.1. Non-Amplified Heterogeneous Hybridization Assays ...	72
2.2.2. Amplified Heterogeneous Hybridization Assays	76
2.2.2.1. Signal Amplification in Heterogeneous	
Hybridization Assays	77
2.2.2.2. Target Amplification in Heterogeneous	
Hybridization Assays	78
2.3. Homogeneous Hybridization Assays	82
2.3.1. Non-Amplified Homogeneous Hybridization Assays ...	82
2.3.1.1. Dual Label Formats	82
2.3.1.2. Single Label Formats	88
2.3.2. Amplified Homogeneous Hybridization Assays	91
2.3.2.1. Dual Interacting Label Formats	91
2.3.2.2. Single Label Formats	95
2.3.2.3. Nucleic Acid Binding Dyes	95
2.4. Conclusions	96
References	97

3. Energy Transfer Fluorescent Labels for DNA Sequencing and Analysis

Jin Xie, Su-Chun Hung, Alexander N. Glazer,
and Richard A. Mathies

3.1. Introduction	105
3.2. Theory of Fluorescence Resonance Energy Transfer	106
3.3. Sanger Dideoxy Chain-Termination Sequencing	107
3.4. Energy-Transfer Fluorescent Primers	107

3.5. ET Cassette for Construction of Energy-Transfer Fluorescent Primers	116
3.6. Energy-Transfer Fluorescent Terminators	119
3.7. Short Tandem Repeat Analysis with Capillary Array Electrophoresis and ET Labels	120
3.8. Biotinylated Energy Transfer Cassettes	122
3.9. Template-Directed Dye-Terminator Incorporation	123
3.10. Conclusions	125
Acknowledgments	125
References	125

4. On-the-Fly Fluorescence Lifetime Detection in Capillary Electrophoresis for DNA Analysis

Linda B. McGown

4.1. Introduction	129
Measuring Fluorescence Lifetime On-the-Fly in CE	131
4.2. Analysis of On-the-Fly Lifetime Data	133
4.3. Lifetime Detection of Labeled DNA Primers	133
4.4. DNA Sequencing	138
Restriction Fragment Length Polymorphism Analysis	142
4.5. Conclusions	146
References	148

5. Fluorescent Nucleoside Analogues as DNA Probes

Mary E. Hawkins

5.1. Introduction	151
5.2. Pteridine Nucleoside Analogues	152
5.2.1. Background	152
5.2.1.1. Effect of pH on Fluorescence Emission	154
5.2.1.2. Fluorescence of Pteridine Analogue-Combining Oligonucleotides	155
5.2.1.3. Melting Temperatures	156
5.3. Applications Using Pteridine	161
5.3.1. Integrase Assay	161
5.3.2. Bulge Hybridization Probes	164
5.3.3. Anisotropy	165
5.3.4. Intracellular Transport of Oligonucleotides	168
5.3.5. DNA Conformation	169

5.4.	2-Amino Purine	170
5.4.1.	Background	170
5.4.2.	Applications	170
5.5.	1,N ⁶ -Ethenoadenosine	172
5.6.	Summary and Outlook	172
	Acknowledgments	173
	References	174

6. Lanthanide-Labeled DNA

Paul R. Selvin

6.1.	Overview	177
6.2.	Lanthanide as Luminescent Labels	178
6.2.1.	Representative Chelats	178
6.2.2.	Sensitivity	182
6.2.3.	Multiple Labeling and Selected Applications	183
6.3.	Imaging	189
6.3.1.	Alternative Time-Resolved Probes	192
6.4.	Lanthanides as Donors in Resonance Energy Transfer	192
6.5.	Advantages of LRET	193
6.6.	LRET Applied to Protein–DNA Interactions	197
6.6.1.	Protein-Induced DNA Bends	197
6.7.	New DNA Dyes Based on LRET with Tuneable Emission Color and Excited-State Lifetime	202
6.8.	Conclusion	207
	References	208

7. DNA Arrays for Genetic Analyses and Medical Diagnosis

Sabato D’Auria, Mosè Rossi, Joanna Malicka,
Zygmunt Gryczynski, and Ignacy Gryczynski

7.1.	Introduction	213
7.2.	Sample Preparation	214
7.2.1.	Spotting Method	214
7.2.2.	<i>In Situ</i> Syntheses Method	216
7.3.	Fluorescence Probes	220
7.4.	Arrayers	223
7.5.	Image Analysis	225
7.5.1.	Array Target Segmentation	226
7.5.2.	Background Intensity Extraction	227
7.5.3.	Target Detection	227

7.5.4. Target Intensity Extraction	228
7.5.5. Ratio Analysis	228
7.5.6. Multiple Image Analysis	229
7.6. Applications	229
7.7. Perspectives	233
Acknowledgment	234
References	234

8. Flow Cytometric Sizing of DNA Fragments

W. Patrick Ambrose, Hong Cai, Peter M. Goodwin, James H. Jett,
Robert C. Habbersett, Erica J. Larson, W. Kevin Grace,
James H. Werner, and Richard A. Keller

8.1. Introduction	239
8.2. Single Molecule Detection	239
8.3. DNA Fragment Sizing	244
8.3.1. Apparatus	247
8.3.2. Data Analysis	248
8.3.3. Sample Preparation	249
8.3.4. Sizing of λ DNA, μ Digests, and λ Concatamers	249
8.3.5. Applications	252
8.3.5.1. PAC Clones	252
8.3.5.2. PCR Fragments	255
8.3.5.3. Bacteria Species and Strain Discrimination	260
8.4. Summary	265
Acknowledgments	268
References	268

9. Fluorimetric DNA Biosensors

Paul A. E. Piunno and Ulrich J. Krull

9.1. Introduction	271
9.2. Fluorimetric Fiber Optic Biosensors	273
9.3. Evanescent Wave Biosensors	274
9.4. Nonevanescent Intrinsic Mode Biosensors	279
9.5. Selectivity and Calibrations Issues	281
9.6. A Reagentless Biosensor	284
9.7. Future	286
References	287

10. Technicolor Genome Analysis

Michael J. Difilippantonio and Thomas Ried

10.1. Introduction	291
10.1.1. Historical Perspective	291
10.2. Principles behind FISH	294
10.2.1. Preparation of Cytological Specimens	296
10.2.2. Preparation of DNA Probes	299
10.2.3. Labeling of DNA Probes	300
10.2.4. Hybridization of Probe to Speciment	301
10.2.5. Detection and Visualization	302
10.2.6. High Sensitivity Detection Procedures	302
10.3. Applications of FISH	303
10.3.1. Gene Mapping	303
10.3.2. Somatic Hybrid Analysis	304
10.3.3. Clinical and Cancer Cytogenetics	305
10.3.4. Chromosome Evolution	305
10.4. Karyotype Analysis	307
10.4.1. Comparative Genome Hybridization	308
10.4.2. Spectral Karyotyping	310
References	311
Index	317