

Photonic Structures Inspired By Nature

[DOWNLOAD HERE](#)

1; Photonic Structures Inspired by Nature; 3 1.1; Supervisor's Foreword; 7 1.2; Acknowledgments; 9 1.3; Contents; 11 1.4; 1 Introduction; 14 1.4.1; References; 16 1.5; 2 Theoretical Aspects of Photonic Structures; 17 1.5.1; 2.1 Reflection and Refraction at Optical Interfaces; 18 1.5.2; 2.2 Thin Film Interference; 19 1.5.3; 2.3 Multilayer Reflectivity; 21 1.5.3.1; 2.3.1 Qualitative Analysis of Multilayer Interference; 21 1.5.3.2; 2.3.2 Quantitative Analysis of Multilayer Interference; 22 1.5.3.2.1; 2.3.2.1 Rouard's Technique; 22 1.5.3.2.2; 2.3.2.2 Results; 23 1.5.4; 2.4 Band-Gaps of One-Dimensional Photonic Crystals; 24 1.5.5; 2.5 Multilayer Resonance Cavities; 30 1.5.6; 2.6 Diffraction from Periodic Surface Structures; 33 1.5.6.1; 2.6.1 Diffraction in the Fraunhofer Approximation; 34 1.5.6.2; 2.6.2 Finite-Difference Time-Domain Modelling of Diffraction; 35 1.5.7; References; 38 1.6; 3 Structural Colours in Nature; 40 1.6.1; 3.1 Structural Colours in the Animal Kingdom; 41 1.6.1.1; 3.1.1 Simple Multilayers: The Japanese Jewel Beetle; 41 1.6.1.2; 3.1.2 Complex Multilayer Arrangements in Butterfly and Moth Structures; 42 1.6.1.2.1; 3.1.2.1 Enhanced Reflectivity in the Moth *Chrysiridia rhipheus*: Using Air as a Multilayer Material; 43 1.6.1.2.2; 3.1.2.2 Sculpted Multilayer Structures: *Papilio palinurus* and *Papilio blumei*; 46 1.6.1.2.3; 3.1.2.3 Fine-Structured Christmas-Tree -Like Ridges on the Scales of *Morpho rhetenor*; 48 1.6.2; 3.2 Floral Diffractive Structures; 50 1.6.2.1; 3.2.1 Diffraction and Iridescence from Striations on Flower Petals; 50 1.6.2.1.1; 3.2.1.1 Optical Characterisation; 51 1.6.2.1.2; 3.2.1.2 Iridescence, a Cue for Pollinators; 56 1.6.2.2; 3.2.2 Near-UV Reflectivity Enhancement by Grating-Like Striations; 60 1.6.3; 3.3 Conclusion; 63 1.6.4; References; 64 1.7; 4 Materials and Techniques; 68 1.7.1; 4.1 Materials; 68 1.7.1.1; 4.1.1 Polymer Materials; 68 1.7.1.1.1; 4.1.1.1 Teflon^{reg}AF; 68 1.7.1.1.2; 4.1.1.2 Polystyrene; 69 1.7.1.1.3; 4.1.1.3 Polystyrene Colloids; 69 1.7.1.1.4; 4.1.1.4 Polydimethylsiloxane; 70 1.7.1.1.5; 4.1.1.5 Polyisoprene--Polystyrene Triblock Copolymer; 70 1.7.1.1.6; 4.1.1.6 Dental Wax; 70 1.7.1.1.7; 4.1.1.7 Organic Dyes; 71 1.7.1.2; 4.1.2 Metal Oxides; 72 1.7.1.2.1; 4.1.2.1 Aluminium Oxide; 72 1.7.1.2.2; 4.1.2.2 Titanium(IV)oxide; 72 1.7.2; 4.2 Techniques: Multilayer Production; 72 1.7.2.1; 4.2.1 Sequential Spin-Coating; 72 1.7.2.2; 4.2.2 Floating and Stacking; 73 1.7.2.3; 4.2.3 Atomic Layer Deposition; 74 1.7.3; 4.3 Techniques: Pattern Creation and Transfer; 77 1.7.3.1; 4.3.1 Colloid Templating; 77 1.7.3.2; 4.3.2

Argon Ion Milling;78 1.7.3.3;4.3.3 Nano-Imprint Lithography;80 1.7.3.4;4.3.4 Dental Wax Casting;81 1.7.4;4.4 Techniques: Sample Characterisation;81 1.7.4.1;4.4.1 Gonio-Spectroscopy;82 1.7.4.2;4.4.2 Micro-Spectroscopy;84 1.7.4.3;4.4.3 Ellipsometry;85 1.7.5;References;86 1.8;5 Static and Tuneable One-Dimensional Photonic Structures;90 1.8.1;5.1 Static One-Dimensional Optical Devices;90 1.8.1.1;5.1.1 Organic Bragg Reflectors;91 1.8.1.2;5.1.2 Organic Resonance Cavities;95 1.8.2;5.2 Stretch-Tuneable Dielectric Mirrors and Optical Microcavities;98 1.8.2.1;5.2.1 Sample Preparation and Experimental Setup;99 1.8.2.1.1;5.2.1.1 Cut and Stack Technique;101 1.8.2.1.2;5.2.1.2 Roll-Up Technique;101 1.8.2.1.3;5.2.1.3 Origami Technique;101 1.8.2.2;5.2.2 Cavity Design and Modelling;102 1.8.2.3;5.2.3 Results and Discussions;103 1.8.3;5.3 Conclusion;107 1.8.4;References;108 1.9;6 Microfabrication of Photonic Structures with Higher Dimensionality;110 1.9.1;6.1 Template-Assisted Ion Milling;111 1.9.1.1;6.1.1 The Ion Milling Template;111 1.9.1.2;6.1.2 Micro-Cones;111 1.9.1.3;6.1.3 Gold Crowns on Micro-Cones;113 1.9.1.4;6.1.4 Multilayer Patterning by Ion Milling;116 1.9.2;6.2 Nano-Imprinting of Photonic Structures;120 1.9.2.1;6.2.1 Imprinting with Micro-Cone Masters;120 1.9.2.2;6.2.2 Replication of Micro-Cones for Flexible Cell Substrates;122 1.9.2.3;6.2.3 Fabrication of an Imprint Master for the Replication of Butterfly Wing Scale P EAN/ISBN : 9783642151699 Publisher(s): Springer, Berlin Discussed keywords: Photonik Format: ePub/PDF Author(s): Kolle, Mathias

[DOWNLOAD HERE](#)

Similar manuals:

[Photonic Structures Inspired By Nature](#)