Record Nr. Autore Titolo	UNINA9910139168003321 Tilley R. J. D Colour and the optical properties of materials [[electronic resource]]: an exploration of the relationship between light, the optical properties of materials and colour / / Richard J.D. Tilley
Pubbl/distr/stampa	Chichester, West Sussex, U.K., : Wiley, 2011
ISBN	1-280-75100-2 9786613677839 0-470-97477-X 0-470-97476-1
Edizione	[2nd ed.]
Descrizione fisica	1 online resource (472 p.)
Disciplina	535.6
Soggetti	Light Optics Color Electronic books.
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Includes index.
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	<ul> <li>Preface. 1 Light and Colour. 1.1 Colour and light. 1.2 Colour and energy. 1.3 Light waves. 1.4 Interference. 1.5 Light waves and colour.</li> <li>1.6 Black body radiation and incandescence. 1.7 The colour of incandescent objects. 1.8 Photons. 1.9 Lamps and lasers. 1.10 Vision.</li> </ul>

1.

film in air. 3.4 The reflectivity of a single thin film in air. 3.5 The colour of a single thin film on a substrate. 3.6 The reflectivity of a single thin film on a substrate. 3.7 Low-reflection and high-reflection films. 3.8 Multiple thin films. 3.9 Fibre Bragg Gratings. 3.10 "Smart" windows. 3.11 Photonic engineering in nature. 3.12 Further reading. 3.13 Problems and exercises. Appendix 3.1 The colour of a thin film in white light. Further Reading. 4 Polarisation and crystals. 4.1 Polarisation of light. 4.2 Polarisation by reflection. 4.3 Polars. 4.4 Crystal symmetry and refractive index. 4.5 Double refraction: calcite as an example. 4.6 The description of double refraction effects. 4.7 Colour produced by polarisation and birefringence. 4.8 Pleochroism and dichroism. 4.9 Nonlinear effects. 4.10 Frequency matching and phase matching. 4.11 More on second harmonic generation. 4.12 Optical activity. 4.13 Liquid crystals. Further reading. 5 Colour due to Scattering. 5.1 Scattering and extinction. 5.2 Tyndall blue and Rayleigh scattering. 5.3 Blue skies, red sunsets. 5.4 Scattering and polarisation. 5.5 Mie scattering. 5.6 Blue eyes and some blue feathers. 5.7 Paints, sunscreens and related matters. 5.8 Multiple scattering. 5.9 Gold sols and ruby glass. 5.10 The Lycurgus Cup. Further reading. 6 Colour due to Diffraction. 6.1 Diffraction and colour production by a slit. 6.2 Diffraction and colour production by a rectangular aperture. 6.3 Diffraction and colour production by a circular aperture. 6.4 The diffraction limit of optical instruments. 6.5 Colour production by linear diffraction gratings. 6.6 Two-dimensional gratings. 6.7 Estimation of the wavelength of light by diffraction. 6.8 Diffraction by crystals and crystal-like structures. 6.9 Disordered diffraction gratings. 6.10 Diffraction by sub-wavelength structures. 6.11 Holograms. Further reading. 7 Colour from Atoms and lons. 7.1 The spectra of atoms and ions. 7.2 Terms and levels. 7.3 Atomic spectra and chemical analysis. 7.4 Fraunhofer lines and stellar spectra. 7.5 Neon signs and early plasma displays. 7.6 The heliumneon laser. 7.7 Sodium and mercury street lights. 7.8 Transition metals and crystal field colours. 7.9 Crystal field splitting, energy levels and terms. 7.10 The colour of ruby. 7.11 Transition-metal-ion lasers. 7.12 Emerald, alexandrite and crystal field strength. 7.13 Crystal field colours in minerals and gemstones. 7.14 Colour as a structural probe. 7.15 Colours from lanthanide ions, 7.16 The neodymium (Nd3+) solid state laser: a four level laser. 7.17 Amplification of optical fibre signals. 7.18 Transition metal and lanthanide pigments. 7.19 Spectral hole formation. 7.20 Further reading. 7.21 Problems and exercises. Appendix 7.1 Electron configurations. Appendix 7.2 Terms and levels. Further Reading. 8 Colour from Molecules. 8.1 The energy levels of molecules. 8.2 The colours arising in some simple inorganic molecules. 8.3 The colour of water. 8.4 Chromophores, chromogens and auxochromes. 8.5 Conjugated bonds in organic molecules: the carotenoids. 8.6 Conjugated bonds circling metal atoms: porphyrins and phthalocyanines. 8.7 Naturally occurring colorants: flavonoid pigments. 8.8 Autumn leaves. 8.9 Some dyes and pigments. 8.10 Charge transfer colours. 8.11 Colour change sensors. 8.12 Dye lasers. 8.13 Photochromic organic molecules. Further reading. 9 Luminescence. 9.1 Luminescence. 9.2 Activators, sensitizers and fluorophores. 9.3 Atomic processes in photoluminescence. 9.4 Fluorescent lamps. 9.5 Plasma displays. 9.6 Cathodoluminescence and cathode ray tubes (CRTs). 9.7 Field emission displays (FEDs). 9.8 Phosphor electroluminescent displays. 9.9 Upconversion. 9.10 Quantum cutting. 9.11 Fluorescent molecules. 9.12 Fluorescent nanoparticles. 9.13 Fluorescent markers and sensors. 9.14 Chemiluminescence and Bioluminescence. 9.15 Triboluminescence. 9.16 Scintillators. Further reading. 10 Colour in Metals, Semiconductors

	and Insulators. 10.1 The colours of insulators. 10.2 Excitons. 10.3 Impurity colours in insulators. 10.4 Impurity colours in diamond. 10.5 Colour centres. 10.6 The colours of semiconductors. 10.7 The colours of semiconductor alloys. 10.8 Light emitting diodes (LEDs). 10.9 Semiconductor diode lasers. 10.10 Semiconductor nanostructures. 10.11 Organic semiconductors and electroluminescence. 10.12 Electrochromic films. 10.13 Photovoltaics. 10.14 Digital photography. 10.15 The colours of metals. 10.16 The colours of metal nanoparticles. 10.17 Extraordinary light transmission and plasmonic crystals. Further Reading. Index.
Sommario/riassunto	'Colour and the Optical Properties of Materials' carefully introduces the science behind the subject, along with many modern and cutting-edge applications, chosen to appeal to today's students.