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Appendix A

Suggested further reading

Laser and photonics

Agrawal G P	*Nonlinear Fiber Optics*, 4th edn (New York: Academic, 2007)
Boyd R W	*Nonlinear Optics*, 2nd edn (New York: Academic, 2003)
Diels J-C and Rudolph W	*Ultrashort Laser Pulse Phenomena: Fundamentals, Techniques, and Applications on a Femtosecond Time Scale* (New York: Academic, 1996)
Duarte F J	*Tunable Laser Applications*, 2nd edn (Boca Raton, FL: CRC Press, 2009)
Eichler H J, Günter P, Pohl D W	*Laser-Induced Dynamic Gratings* (Berlin: Springer, 1986)
Hasegawa A	*Optical Solitons in Fibers* (Berlin: Springer, 1989)
Hetch J	*The Laser Guidebook* (New York: McGraw-Hill, 1986)
Hitz B, Ewing J J, Hetch J	*Introduction to Laser Technology* 3rd edn (Piscataway, NJ: IEEE Press, 1991)
Kroechner W	*Solid-State Laser Engineering* 5th edn (Berlin: Springer, 1999)
Menzel R	*Photonics: Linear and Nonlinear Interactions of Laser Light and Matter* (Berlin: Springer, 2001)
Miloni P W and Eberley J H	*Laser Physics* (New York: Wiley, 2010)
O'Shea D C	*Introduction to Lasers and their Applications* (Englewood Cliffs, NJ: Prentice-Hall, 1977)
Rullière C	*Femtosecond Laser Pulses: Principles and Experiments* (Berlin: Springer, 2003)
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Sirohi R S	*A Course of Experiments with He-Ne Laser* (Hoboken, NJ: Wiley Eastern Ltd, 1985)
Sutherland R L	*Handbook of Nonlinear Optics* (New York: Marcel Dekker, 2003)
Svelto O	*Principles of Lasers* translated from Italian and edited by Hana D C (Berlin: Springer, 1998)
Thyagarajan, K and Ghatak A	*Lasers Fundamentals and Applications* (Berlin: Springer, 1981)
Trebino R	*Frequency-Resolved Optical Gating: The Measurement of Ultrashort Laser Pulses* (Berlin: Springer, 2000)
Verdeyen, J T	*Laser Electronics* (New Delhi: PHI, 1981)
Weber M	*Handbook of Laser Wavelengths* (Boca Raton, FL: CRC Press, 1998)
Wilson J and Hawkes J F B	*Lasers Principles and Applications* (Englewood Cliffs, NJ: Prentice-Hall, 1987)
Wilson J and Hawkes J F B	*Optoelectronics: An Introduction* (Englewood Cliffs, NJ: Prentice-Hall, 1983)
Yariv A	*Quantum Electronics* 3rd edn (New York: Wiley, 1989)

Optics and spectroscopy

Abramczyk H	*Introduction to Laser Spectroscopy* (Amsterdam: Elsevier, 2005)
Banwell C N and McCash E M	*Fundamentals of Molecular Spectroscopy* (New Delhi: Tata McGraw-Hill, 1997)
Demtröder W	*Laser Spectroscopy* (Berlin: Springer, 2003)
Fleming G R	*Chemical Applications of Ultrafast Spectroscopy* (Oxford: Oxford University Press, 1986)
Fowles G R	*Introduction to Modern Optics* 2nd edn (New York: Dover Publications, 1975)
Ghatak A	*Optics* 4th edn (New Delhi: Tata McGraw Hill Education, 2009)
Kroechner W	*Solid-State Laser Engineering* 5th edn (Berlin: Springer, 1999)
Parkar CA	*Photoluminescence of Solutions* (Amsterdam: Elsevier, 1968)
Streetman B G and Banerjee S	*Solid State Electronic Devices* (New Delhi: PHI, 2006)
Struve W S	*Fundamentals of Molecular Spectroscopy* (New York: Wiley, 1989)
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White H E	*Introduction to Atomic Spectra* (New York: McGraw-Hill, 1934)

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Appendix B

Luminescence

Luminescence is the inherent property of spontaneous emission by an object (known as a *fluorophore* or a *chromophore*) as a result of excitation by an external agency. This is in contrast with *incandescence*, in which light is emitted from a hot object such as a filament of a bulb. Materials exhibiting the property of luminescence are called *phosphors* or luminescent materials. The word 'luminescence' was introduced by Eilhard Wiedemann in the 1880s. In Latin, 'lumen' is a synonym for light. Depending on the lifetime of the excited fluorophore, luminescence is further divided into fluorescence and phosphorescence (see chapter 2). Luminescence is also categorized according to the external source of excitation. Some of these categories are as follows:

Bioluminescence	A result of biochemical reactions in living organisms, such as fireflies
Cathodoluminescence	Observed when high-energy electrons hit a luminescent material
Chemiluminescence	Certain materials emit light as a result of chemical reactions
Crystalloluminescence	A type of luminescence observed during the crystallization of some materials
Electroluminescence	Observed when an electric field is applied across a material; this is in contrast to the phenomenon of *incandescence*
Lyoluminescence	A kind of *chemiluminescence* observed when a solid is dissolved in a solvent
Photoluminescence	Observed when a material is excited by light (EM radiation)
Piezoluminescence	Emission occurs when certain piezoelectric crystals are subjected to pressure; also known as *mechanoluminescence*
Radioluminescence	Occurs due to the bombardment of a material by ionizing radiation
Sonoluminescence	A kind of *mechanoluminescence* generated when gas bubbles in a liquid are excited by sound
Thermoluminescence	Crystals pre-irradiated by ionizing radiation (such as gamma rays that produce defect levels) emit light upon heating
Triboluminescence	Occurs in some materials when subjected to stress or strain; can take place due to friction between two stones

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Appendix C

Physical constants

Quantity	Symbol	Value in MKS units
Avogadro's number	N_A	6.02214×10^{23} mole^{-1}
Boltzmann constant	K_B	1.3806×10^{-23} J K^{-1}
Elementary charge	e	1.60218×10^{-19} C
Electron mass	m_e	9.10939×10^{-31} kg
Proton mass	m_p	1.672621×10^{-27} kg
Permeability of free space	ϵ_0	8.85×10^{-12} C^{2}N^{-1}m^{-2}
Permittivity of free space	μ_0	$4\pi \times 10^{-7}$ NA^{-2}
Planck's constant	h	6.2607×10^{-34} J s
Rydberg constant	R_∞	1.097373×10^5 cm^{-1}
Speed of light in vacuum	c	2.997925×10^8 ms^{-1}
Stefan–Boltzmann constant	σ	5.68×10^{-8} Wm^{-2}K^{-4}

Abbreviations: J: joules, K: kelvin, C: coulombs, N: newtons, A: ampere, m: meters, kg: kilograms, s: seconds, W: watts.

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