

## 4. PRODUCTION AND PROPERTIES OF RADIATIONS

## 4.2.6 (cont.)

Zachariasen, W. H. (1945). *Theory of X-ray diffraction in crystals*. New York: Dover.

## 4.3.1

Bethe, H. A. (1928). *Theorie der Beugung von Elektronen an Kristallen*. *Ann. Phys (Leipzig)*, **87**, 55–129.

Blackman, M. (1939). *On the intensities of electron diffraction rings*. *Proc. R. Soc. London Ser A*, **173**, 68–82.

Coulthard, M. A. (1967). *A relativistic Hartree–Fock atomic field calculation*. *Proc. Phys. Soc.* **91**, 44–49.

Cowley, J. M. & Moodie, A. F. (1957). *The scattering of electrons by atoms and crystals. I. A new theoretical approach*. *Acta Cryst.* **10**, 609–619.

Cromer, D. T. & Waber, J. T. (1974). *Atomic scattering factors for X-rays*. *International tables for X-ray crystallography*, Vol. IV, Section 2.2. Birmingham: Kynoch Press. (Present distributor Kluwer Academic Publishers, Dordrecht.)

Doyle, P. A. & Turner, P. S. (1968). *Relativistic Hartree–Fock X-ray and electron scattering factors*. *Acta Cryst.* **A24**, 390–397.

Fox, A. G., O’Keefe, M. A. & Tabbernor, M. A. (1989). *Relativistic Hartree–Fock X-ray and electron atomic scattering factors at high angles*. *Acta Cryst.* **A45**, 786–793.

Fujiwara, K. (1959). *Application of higher-order Born approximation to multiple elastic scattering of electrons in crystals*. *J. Phys. Soc. Jpn*, **14**, 1513–1524.

Fujiwara, K. (1961). *Relativistic dynamical theory of electron diffraction*. *J. Phys. Soc. Jpn*, **16**, 2226–2238.

Ibers, J. A. (1958). *Atomic scattering amplitudes for electrons*. *Acta Cryst.* **11**, 178–183.

*International Tables for Crystallography* (1992). Vol. B. Dordrecht: Kluwer Academic Publishers.

*International Tables for X-ray Crystallography* (1974). Vol. IV. Birmingham: Kynoch Press. (Present distributor Kluwer Academic Publishers, Dordrecht.)

MacGillavry, C. H. (1940). *Zur Prufung der Dynamischen Theorie der Elektronenbeugung an Kristallgitter*. *Physica (Utrecht)*, **7**, 329–343.

Mann, J. B. (1968). Los Alamos Scientific Laboratory Report LA3691, p. 168.

Peng, L. M. & Cowley, J. M. (1988). *Errors arising from numerical use of the Mott formula in electron image simulation*. *Acta Cryst.* **A44**, 1–5.

Rez, D., Rez, P. & Grant, I. (1994). *Dirac–Fock calculations of X-ray scattering factors and contributions to the mean inner potential for electron scattering*. *Acta Cryst.* **A50**, 481–497.

## 4.3.2

Bird, D. M. & King, Q. A. (1990). *Absorptive form factors for high-energy electron diffraction*. *Acta Cryst.* **A46**, 202–208.

Doyle, P. A. & Turner, P. S. (1968). *Relativistic Hartree–Fock X-ray and electron scattering factors*. *Acta Cryst.* **A24**, 390–397.

Fox, A. G., O’Keefe, M. A. & Tabbernor, M. A. (1989). *Relativistic Hartree–Fock X-ray and electron atomic scattering factors at high angles*. *Acta Cryst.* **A45**, 786–793.

Peng, L.-M. (1998). *Electron scattering factors of ions and their parameterization*. *Acta Cryst.* **A54**, 481–485.

Peng, L. M., Ren, G., Dudarev, S. L. & Whelan, M. J. (1996). *Robust parameterization of elastic and absorptive electron atomic scattering factors*. *Acta Cryst.* **A52**, 257–276.

Rez, D., Rez, P. & Grant, I. (1994). *Dirac–Fock calculations of X-ray scattering factors and contributions to the mean inner potential for electron scattering*. *Acta Cryst.* **A50**, 481–497.

Weickenmeier, A. & Kohl, H. (1991). *Computation of absorptive form factors for high-energy electron diffraction*. *Acta Cryst.* **A47**, 590–597.

## 4.3.3

Arnesen, S. P. & Seip, H. M. (1966). *Studies on the failure of the first Born approximation in electron diffraction. V. Molybdenum- and tungsten hexacarbonyl*. *Acta Chem. Scand.* **20**, 2711–2727.

Bartell, L. S. (1975). *Modification of Glauber theory for dynamic scattering of electrons by polyatomic molecules*. *J. Chem. Phys.* **63**, 3750–3755.

Bartell, L. S. & Brockway, L. O. (1953). *The investigation of electron distribution in atoms by electron diffraction*. *Phys. Rev.* **90**, 833–838.

Bartell, L. S. & Gavin, R. M. Jr (1964). *Effects of electron correlation in X-ray and electron diffraction*. *J. Am. Chem. Soc.* **86**, 3493–3498.

Bartell, L. S. & Miller, B. (1980). *Extension of Glauber theory to account for intratarget diffraction in multicenter scattering*. *J. Chem. Phys.* **72**, 800–807.

Bartell, L. S. & Wong, T. C. (1972). *Three-atom scattering in gas-phase electron diffraction: a tractable limiting case*. *J. Chem. Phys.* **56**, 2364–2367.

Bethe, H. A. (1930). *Zur Theorie des Durchgangs Schneller Korpuskularstrahlen durch Materie*. *Ann. Phys. (Leipzig)*, **5**, 325–400.

Biggs, F., Mendelsohn, L. B. & Mann, J. B. (1975). *Hartree–Fock Compton profiles for the elements*. *At. Data Nucl. Data Tables*, **16**, 210–309.

Bonham, R. A. (1965a). *Multiple elastic intramolecular scattering in gas electron diffraction*. *J. Chem. Phys.* **43**, 1103–1109.

Bonham, R. A. (1965b). *Corrections to the incoherent scattering factor for electrons and X-rays*. *J. Chem. Phys.* **43**, 1460–1464.

Bonham, R. A. (1966). *Dynamic effects in gas electron diffraction*. *Trans. Am. Crystallogr. Assoc.* **2**, 165–172.

Bonham, R. A. (1967). *Some new relations connecting molecular properties and electron and X-ray diffraction intensities*. *J. Phys. Chem.* **71**, 856–862.

Bonham, R. A. & Cox, H. L. Jr (1967). *40-kV electron scattering from Ne, Ar, Kr, and Xe measured by the sector-microphotometer electron-diffraction method*. *J. Chem. Phys.* **47**, 3508–3517.

Bonham, R. A. & Fink, M. (1974). *High energy electron scattering*, Chaps. 5 and 6. New York: Van Nostrand Reinhold.

Bonham, R. A. & Iijima, T. (1965). *Preliminary electron-diffraction study of H<sub>2</sub> at small scattering angles*. *J. Chem. Phys.* **42**, 2612–2614.

Bonham, R. A. & Su, L. S. (1966). *Use of Hellman–Feynman and hyperviral theorems to obtain anharmonic vibration-rotation expectation values and their application to gas diffraction*. *J. Chem. Phys.* **45**, 2827–2831.

## REFERENCES

## 4.3.3 (cont.)

- Breitenstein, M., Endesfelder, A., Meyer, H. & Schweig, A. (1984). *CI calculations of electron-scattering cross sections for some linear molecules*. *Chem. Phys. Lett.* **108**, 430–434.
- Breitenstein, M., Endesfelder, A., Meyer, H., Schweig, A. & Zittlau, W. (1983). *Electron correlation effects in electron scattering cross-section calculations of N<sub>2</sub>*. *Chem. Phys. Lett.* **97**, 403–409.
- Breitenstein, M., Mawhorter, R. J., Meyer, H. & Schweig, A. (1984). *Theoretical study of potential-energy differences from high-energy electron scattering cross sections of CO<sub>2</sub>*. *Phys. Rev. Lett.* **53**, 2398–2401.
- Breitenstein, M., Mawhorter, R. J., Meyer, H. & Schweig, A. (1986). *Vibrational effects on electron-molecule scattering for polyatomics in the first Born approximation: H<sub>2</sub>O*. *Mol. Phys.* **57**, 81–88.
- Bunge, C. F., Barrientos, J. & Bunge, A. V. (1993). *Roothaan-Hartree-Fock ground-state atomic wave functions: Slater-type orbital expansions and expectation values*. *At. Data Nucl. Data Tables*, **53**, 113–162.
- Bunyan, P. J. (1963). *The effect of multiple elastic scattering in gas electron diffraction*. *Proc. Phys. Soc.* **82**, 1051–1057.
- Coffman, D., Fink, M. & Wellenstein, H. (1985). *Elastic small-angle electron scattering by He, Ne, and Ar at 35 keV*. *Phys. Rev. Lett.* **55**, 1392–1394.
- Epstein, J. & Stewart, R. F. (1977). *X-ray and electron scattering from diatomic molecules in the first Born approximation*. *J. Chem. Phys.* **66**, 4057–4064.
- Fink, M., Bonham, R. A., Lee, J. S. & Ng, E. W. (1969). *Large angle scattering from N<sub>2</sub> with 40 keV electrons*. *Chem. Phys. Lett.* **4**, 347–351.
- Fink, M. & Kessler, J. (1966). *Absolute Wirkungsquerschnitte für Elektronenstreuung um kleine Winkel. Experimente zum Gültigkeitsbereich der Ersten Bornschen Näherung*. *Z. Phys.* **196**, 1–15.
- Geiger, J. (1964). *Streuung von 25 keV-Elektronen an Gasen. II. Streuung an Neon, Argon, Krypton und Xenon*. *Z. Phys.* **177**, 138–145.
- Gjønnes, J. (1964). *A dynamic effect in electron diffraction by molecules*. *Acta Cryst.* **17**, 1075–1076.
- Glauber, R. & Schomacher, V. (1953). *The theory of electron diffraction*. *Phys. Rev.* **89**, 667–671.
- Hanson, H. P. (1962). *Experimental f values and electron diffraction amplitudes for bromine*. *J. Chem. Phys.* **36**, 1043–1049.
- Heisenberg, W. (1931). *Über die Inkohärente Streuung von Röntgenstrahlen*. *Phys. Z.* **32**, 737–740.
- Hilderbrandt, R. L. & Kohl, D. A. (1981). *A variational treatment of the effects of vibrational anharmonicity on gas-phase electron diffraction intensities. Part I. Molecular scattering function*. *J. Mol. Struct. Theochem.* **85**, 25–36.
- Hoerni, J. A. (1956). *Multiple elastic scattering in electron diffraction by molecules*. *Phys. Rev.* **102**, 1530–1533.
- Horota, F., Kakuta, N. & Shibata, S. (1981). *High energy electron scattering by diborane*. *J. Phys. B*, **14**, 3299–3304.
- Iijima, T., Bonham, R. A. & Ando, T. (1963). *The theory of electron scattering from molecules. I. Theoretical development*. *J. Phys. Chem.* **67**, 1472–1474.
- Karle, I. L. & Karle, J. (1950). *Internal motion and molecular structure studies by electron diffraction. III. Structure of CH<sub>2</sub>CF<sub>2</sub> and CF<sub>2</sub>CF<sub>2</sub>*. *J. Chem. Phys.* **18**, 963–971.
- Kelley, M. H. & Fink, M. (1982a). *The molecular structure of dimolybdenum tetraacetate*. *J. Chem. Phys.* **76**, 1407–1416.
- Kelley, M. H. & Fink, M. (1982b). *The temperature dependence of the molecular structure parameters in SF<sub>6</sub>*. *J. Chem. Phys.* **77**, 1813–1817.
- Kessler, J. (1959). *Einzelstreuung Mittelschneller Elektronen an Schweren Atomkernen*. *Z. Phys.* **155**, 350–367.
- Ketkar, S. N. & Fink, M. (1985). *Structure of dichromium tetraacetate by gas-phase electron diffraction*. *J. Am. Chem. Soc.* **107**, 338–340.
- Kimura, M., Schomaker, V., Smith, D. & Weinstock, B. (1968). *Electron-diffraction investigation of the hexafluorides of tungsten, osmium, iridium, uranium, neptunium, and plutonium*. *J. Chem. Phys.* **48**, 4001–4012.
- Kohl, D. A. & Arvedson, M. (1980). *Elastic electron scattering from molecular potentials*. *J. Chem. Phys.* **73**, 3818–3822.
- Kohl, D. A. & Bartell, L. S. (1969). *Electron densities from gas-phase electron diffraction intensities. II. Molecular Hartree-Fock cross sections*. *J. Chem. Phys.* **51**, 2896–2904.
- Kohl, D. A. & Bonham, R. A. (1967). *Effect of bond formation on electron scattering cross sections for molecules*. *J. Chem. Phys.* **47**, 1634–1646.
- Kohl, D. A. & Hilderbrandt, R. L. (1981). *A variational treatment of the effects of vibrational anharmonicity on gas-phase electron diffraction intensities. Part II. Temperature dependence*. *J. Mol. Struct. Theochem.* **85**, 325–335.
- Liu, J. W. & Smith, V. H. (1977). *A critical study of high energy electron scattering from H<sub>2</sub>*. *Chem. Phys. Lett.* **45**, 59–63.
- McClelland, J. J. & Fink, M. (1985). *Electron correlation and binding effects in measured electron-scattering cross sections of CO<sub>2</sub>*. *Phys. Rev. Lett.* **54**, 2218–2221.
- McLean, A. D. & McLean, R. S. (1981). *Roothaan-Hartree-Fock atomic wave functions: Slater basis-set expansions for Z = 55–92*. *At. Data Nucl. Data Tables*, **26**, 197–381.
- Mawhorter, R. J. & Fink, M. (1983). *The vibrationally averaged, temperature-dependent structure of polyatomic molecules. II. SO<sub>2</sub>*. *J. Chem. Phys.* **79**, 3292–3296.
- Mawhorter, R. J., Fink, M. & Archer, B. T. (1983). *The vibrationally averaged, temperature-dependent structure of polyatomic molecules. I. CO<sub>2</sub>*. *J. Chem. Phys.* **79**, 170–174.
- Melkanov, M. A., Sawada, T. & Raynal, J. (1966). *Nuclear optical model calculations*. *Meth. Comput. Phys.* **6**, 1–80.
- Miller, B. R. & Fink, M. (1981). *Mean amplitudes of vibration of SF<sub>6</sub> and intramolecular multiple scattering*. *J. Chem. Phys.* **75**, 5326–5328.
- Miller, B. R. & Fink, M. (1985). *The vibrationally averaged, temperature-dependent structure of polyatomic molecules. III. NO<sub>2</sub>*. *J. Chem. Phys.* **83**, 939–944.
- Morse, P. M. (1932). *Unelastische Streuung von Kathodenstrahlen*. *Phys. Z.* **33**, 443–445.
- Mott, N. I. & Massey, H. S. W. (1965). *The theory of atomic collisions*, 3rd ed., Chap. IX, Section 4, equations (22) and (23). Oxford University Press.
- Numerov, B. V. (1924). *A method of extrapolation of perturbations*. *Mon. Not. R. Astron. Soc.* **84**, 592–601.
- Peixoto, E. M. A., Bunge, C. F. & Bonham, R. A. (1969). *Elastic and inelastic electron scattering by He and Ne atoms in their ground states*. *Phys. Rev.* **181**, 322–328.
- Pulay, P., Mawhorter, R. J., Kohl, D. A. & Fink, M. (1983). *Ab initio Hartree-Fock calculation of the elastic electron scattering cross section of sulphur hexafluoride*. *J. Chem. Phys.* **79**, 185–191.
- Ross, A. W. & Fink, M. (1986). *Atomic scattering factor and spin polarization calculations*. *Phys. Rev.* **85**, 6810–6811.
- Sasaki, H., Konaka, S., Iijima, T. & Kimura, M. (1982). *Small-angle electron scattering and electron density in carbon dioxide*. *Int. J. Quantum Chem.* **21**, 475–485.

#### 4. PRODUCTION AND PROPERTIES OF RADIATIONS

##### 4.3.3 (cont.)

- Schäfer, L. & Seip, H. M. (1967). *Studies on the failure of the first Born approximation in electron diffraction. VI. Ruthenium tetraoxide. Acta Chem. Scand.* **21**, 737–744.
- Schomaker, V. & Glauber, R. (1952). *The Born approximation in electron diffraction. Nature (London)*, **170**, 290–291.
- Seip, H. M. (1965). *Studies on the failure of the first Born approximation in electron diffraction. I. Uranium hexafluoride. Acta Chem. Scand.* **19**, 1955–1968.
- Seip, H. M. & Seip, R. (1966). *Studies on the failure of the first Born approximation in electron diffraction. IV. Molybdenum- and tungsten hexafluoride. Acta Chem. Scand.* **20**, 2698–2711.
- Seip, H. M. & Stølevik, V. (1966). *Studies on the failure of the first Born approximation in electron diffraction. II. Osmium tetraoxide. III. Tellurium hexafluoride. Acta Chem. Scand.* **20**, 385–394, 1535–1545.
- Shibata, S., Hirota, F., Kakuta, N. & Muramatsu, T. (1980). *Electron distribution in water by high-energy electron scattering. Int. J. Quantum Chem.* **18**, 281–285.
- Tavard, C. & Bonham, R. A. (1969). *Quantum-mechanical formulas for the inelastic scattering of fast electrons and their Compton line shape. Nonrelativistic approximation. J. Chem. Phys.* **50**, 1736–1747.
- Tavard, C., Rouault, M. & Roux, M. (1965). *Diffraction des rayons X et des électrons par les molécules. III. Une méthode de détermination des densités électroniques moléculaires. J. Chim. Phys.* **62**, 1410–1417.
- Tavard, C. & Roux, M. (1965). *Calcul des intensités de diffraction de rayons X et de électrons par les molécules. C. R. Acad. Sci.* **260**, 4933–4936.
- Thakkar, A. J. & Smith, V. H. Jr (1978). *Form factors and total scattering intensities for the helium-like ions from explicitly correlated wavefunctions. J. Phys. B,* **11**, 3803–3820.
- Wang, J., Esquivel, R. O., Smith, V. H. Jr & Bunge, C. (1995). *Accurate elastic and inelastic scattering factors from He to Ne using correlated wavefunctions. Phys. Rev. A,* **51**, 3812–3818.
- Wang, J., Sagar, R. P., Schmider, H. & Smith, V. H. Jr (1993). *X-ray elastic and inelastic scattering factors for neutral atoms  $Z = 2 - 92$ . At. Data Nucl. Data Tables,* **53**, 233–269.
- Wang, J., Tripathi, A. N. & Smith, V. H. Jr (1994). *Chemical binding and electron correlation effects in X-ray and high energy electron scattering. J. Chem. Phys.* **101**, 4842–4854.
- Wong, T. C. & Bartell, L. S. (1973). *Three atom scattering in gas-phase electron diffraction. II. A general treatment. J. Chem. Phys.* **58**, 5654–5660.
- Xie, S.-D., Fink, M. & Kohl, D. A. (1984). *Basis set dependence of ab initio SCF elastic, Born, electron scattering cross sections for  $C_2H_4$ . J. Chem. Phys.* **81**, 1940–1942.
- Yates, A. C. (1970). *Relativistic effects in high-energy inelastic electron-atom collisions. Chem. Phys. Lett.* **6**, 49–53.
- Yates, A. C. (1971). *A program for calculating relativistic elastic electron-atom collision data. Comput. Phys. Commun.* **2**, 175–179.
- Yates, A. C. & Bonham, R. A. (1969). *Use of relativistic electron scattering factors in electron diffraction analysis. J. Chem. Phys.* **50**, 1056–1058.
- Ahn, C. C. & Rez, P. (1985). *Inner shell edge profiles in electron energy loss spectroscopy. Ultramicroscopy,* **17**, 105–116.
- Altarelli, M. & Smith, S. Y. (1974). *Superconvergence and sum rules for the optical constants: physical meaning, comparison with experiment and generalization. Phys. Rev. B,* **9**, 1290–1298.
- Batson, P. E. (1986). *High energy resolution electron spectrometer for a 1 nm spatial analysis. Rev. Sci. Instrum* **57**, 43–48.
- Batson, P. E. (1987). *Spatially resolved interband spectroscopy. Physical aspects of microscopic characterization of materials,* edited by J. Kirschner, K. Murata & J. A. Venables, pp. 189–195. *Scanning Microscopy, Suppl. I.*
- Batson, P. E. (1989). *High resolution energy-loss spectroscopy. Ultramicroscopy,* **28**, 32–39.
- Batson, P. E. & Silcox, J. (1983). *Experimental energy loss function,  $Im[-1/\epsilon(q, \omega)]$ , for aluminium. Phys. Rev. B,* **27**, 5224–5239.
- Berger, S. D. & McMullan, D. (1989). *Parallel recording for an electron spectrometer on a scanning transmission electron microscope. Ultramicroscopy,* **28**, 122–125.
- Bethe, H. A. (1930). *Zur Theorie des Durchgangs schneller Korpuskularstrahlen durch Materie. Ann. Phys. (Leipzig),* **5**, 325–400.
- Bianconi, A., Fritsch, E., Calas, G. & Petiau, J. (1985). *X-ray absorption near edge structure of 3d transition elements in tetrahedral coordination: the effect of bond length variation. Phys. Rev. B,* **32**, 4292–4295.
- Boersch, H. (1954). *Experimentelle Bestimmung der Energieverteilung in thermisch ausgelosten Elektronenstrahlen. Z. Phys.* **139**, 115–146.
- Bross, H. (1978a). *Anisotropy of plasmon dispersion in Al. Phys. Lett. A,* **64**, 418–420.
- Bross, H. (1978b). *Pseudopotential theory of the dielectric function of Al – the volume plasmon dispersion. J. Phys. F,* **8**, 2631–2649.
- Brydson, R., Sauer, H., Engel, W., Thomas, J. M., Zeitler, E., Kosugi, N. & Kuroda, H. (1989). *Electron energy loss and X-ray absorption spectroscopy of rutile and anatase: a test of structural sensitivity. J. Phys. Condens. Matter,* **1**, 797–812.
- Castaing, R. & Henry, L. (1962). *Filtrage magnétique des vitesses en microscopie électronique. C. R. Acad. Sci. Sér. B,* **255**, 76–78.
- Chen, C. H. & Silcox, J. (1971). *Detection of optical surface guided modes in thin graphite films by high energy electron scattering. Phys. Rev. Lett.* **35**, 390–393.
- Colliex, C. (1984). *Electron energy loss spectroscopy in the electron microscope. Advances in optical and electron microscopy,* Vol. 9, edited by V. E. Cosslett & R. Barer, pp. 65–177. London: Academic Press.
- Colliex, C. (1985). *An illustrated review on various factors governing the high spatial resolution capabilities in EELS microanalysis. Ultramicroscopy,* **18**, 131–150.
- Colliex, C., Gasgnier, M. & Trebbia, P. (1976). *Analysis of the electron excitation spectra in heavy rare earth metals, hydrides and oxides. J. Phys. (Paris),* **27**, 397–406.
- Colliex, C., Manoubi, T., Gasgnier, M. & Brown, L. M. (1985). *Near edge structures on EELS core-loss edges. Scanning Electron Microsc.* **2**, 489–512.
- Colliex, C., Maurice, J. L. & Ugarte, D. (1989). *Frontiers of analytical electron microscopy with special reference to cluster and interface problems. Ultramicroscopy,* **29**, 31–43.
- Craven, A. J. & Buggy, T. W. (1981). *Design considerations and performance of an analytical STEM. Ultramicroscopy,* **7**, 27–37.

##### 4.3.4

Ahn, C. C. & Krivanek, O. L. (1982). *An EELS atlas.* Available from Center for Solid State Science, Arizona State University, Tempe, AZ 85287, USA.

## REFERENCES

## 4.3.4 (cont.)

- Crewe, A. V. (1977a). *Post specimen optics in the STEM. I. General information. Optik (Stuttgart)*, **47**, 299-312.
- Crewe, A. V. (1977b). *Post specimen optics in the STEM. II. Optik (Stuttgart)*, **47**, 371-380.
- Daniels, J., Festenberg, C. V., Raether, H. & Zeppenfeld, K. (1970). *Optical constants of solids by electron spectroscopy. Springer tracts in modern physics*, Vol. 54, pp. 78-135. New York: Springer-Verlag.
- Disko, M. M., Krivanek, O. L. & Rez, P. (1982). *Orientation dependent extended fine structure in EELS. Phys. Rev. B*, **25**, 4252-4255.
- Durham, J. P., Pendry, J. B. & Hodges, C. H. (1981). *XANES: determination of bond angles and multi-atom correlations in ordered and disordered systems. Solid State Commun.* **8**, 159-162.
- Egerton, R. F. (1978). *Formulae for light element analysis by electron energy loss spectrometry. Ultramicroscopy*, **3**, 243-351.
- Egerton, R. F. (1979). *K-shell ionization cross sections for use in microanalysis. Ultramicroscopy*, **4**, 169-179.
- Egerton, R. F. (1980a). *The use of electron lenses between a TEM specimen and an electron spectrometer. Optik (Stuttgart)*, **56**, 363-376.
- Egerton, R. F. (1980b). *Design of an aberration-corrected electron spectrometer for the TEM. Optik (Stuttgart)*, **57**, 229-242.
- Egerton, R. F. (1986). *Electron energy loss spectroscopy in the electron microscope*. New York/London: Plenum.
- Egerton, R. F. & Crozier, P. A. (1987). *A compact parallel recording. J. Microsc.* **148**, 157.
- Enge, H. A. (1967). *Deflecting magnets. Focusing of charged particles*, Vol. 2, edited by A. Septier, pp. 203-264. New York: Academic Press.
- Engel, W., Sauer, H., Zeitler, E., Brydson, R., Williams, B. G. & Thomas, J. M. (1988). *Electron energy loss spectroscopy and the crystal chemistry of rhodizite. J. Chem. Soc. Faraday Trans. 1*, **84**, 617-629.
- Fano, U. (1961). *Effects of configuration interaction on intensities and phase shifts. Phys. Rev.* **124**, 1966-1978.
- Fink, J. & Kisker, E. (1980). *A method for rapid calculation of electron trajectories in multielement electrostatic cylinder lenses. Rev. Sci. Instrum.* **51**, 918-920.
- Fink, J. & Leising, G. (1986). *Momentum dependent dielectric functions of oriented trans-polyacetylen. Phys. Rev. B*, **34**, 5320-5328.
- Fink, J., Müller-Heinzerling, T., Pflüger, J., Scheerer, B., Dischler, B., Koidl, P., Bubenzer, A. & Sah, R. E. (1984). *Investigation of hydrocarbon-plasma-generated carbon films by EELS. Phys. Rev. B*, **30**, 4713-4718.
- Fischer, D. W. (1970). *Molecular orbital interpretation of the soft X-ray  $L_{23}$  emission and absorption spectra from some titanium and vanadium compounds. J. Appl. Phys.* **41**, 3561-3569.
- Gibbons, P. C., Ritsko, J. J. & Schnatterly, S. E. (1975). *Inelastic electron scattering spectrometer. Rev. Sci. Instrum.* **46**, 1546-1554.
- Grunes, L. A., Leapman, R. D., Wilker, C. N., Hoffmann, R. & Kunz, A. B. (1982). *Oxygen K near-edge fine structure: an electron energy-loss investigation with comparisons to new theory for selected 3d transition-metal oxides. Phys. Rev. B*, **25**, 7157-7173.
- Hagemann, H. J., Gudat, W. & Kunz, C. (1975). *Optical constants from the far infrared to the X-ray region: Mg, Al, Cu, Ag, Au, Bi, C, and  $Al_2O_3$ . J. Opt. Soc. Am.* **65**, 742-748.
- Hartl, W. A. M. (1966). *Die Filterlinse als Monochromator für schnelle Elektronen. Z. Phys.* **191**, 487-502.
- Heine, V. (1980). *Electronic structure from the point of view of the local atomic environment. Solid State Phys.* **35**, 1-127.
- Hillier, J. & Baker, R. F. (1944). *Microanalysis by means of electrons. J. Appl. Phys.* **15**, 663-675.
- Hitchcock, A. P. (1982). *Bibliography of atomic and molecular inner-shell excitation studies. J. Electron Spectrosc. Relat. Phenom.* **25**, 245-275. [Updated copies of this bibliography are available from the author on request.]
- Hofer, F., Golob, P. & Brunegger, A. (1988). *EELS quantification of the elements Sr to W by means of  $M_{45}$  edges. Ultramicroscopy*, **25**, 81-84.
- Hohberger, H. I., Otto, A. & Petri, E. (1975). *Plasmon resonance in Al, deviations from quadratic dispersion observed. Solid State Commun.* **16**, 175-179.
- Ibach, H. & Mills, D. L. (1982). *Electron energy-loss spectroscopy and surface vibrations*. New York: Academic Press.
- Inokuti, M. (1971). *Inelastic collisions of fast charged particles with atoms and molecules. The Bethe theory revisited. Rev. Mod. Phys.* **43**, 297-344; Addenda: *Rev. Mod. Phys.* **50**, 23-26.
- Inokuti, M. (1979). *Electron scattering cross sections pertinent to electron microscopy. Ultramicroscopy*, **3**, 423-427.
- Isaacson, M. (1972a). *Interaction of 24keV electrons with the nucleic acid bases, adenine, thymine and uracil. I. Outer shell excitation. J. Chem. Phys.* **56**, 1803-1812.
- Isaacson, M. (1972b). *Interaction of 25keV electrons with the nucleic acid bases, adenine, thymine and uracil. II. Inner shell excitation and inelastic scattering cross section. J. Chem. Phys.* **56**, 1813-1818.
- Isaacson, M. & Johnson, D. (1975). *The microanalysis of light elements using transmitted energy-loss electrons. Ultramicroscopy*, **1**, 33-52.
- Janssen, R. W. & Sankey, O. F. (1987). *Ab initio linear combination of pseudo-atomic orbital scheme for the electronic properties of semiconductors. Results for ten materials. Phys. Rev. B*, **36**, 6520-6531.
- Johnson, D. E. (1979). *Basic aspects of energy-loss spectrometer systems. Ultramicroscopy*, **3**, 361-365.
- Johnson, D. E. (1980). *Post specimen optics for energy loss spectrometry. Scanning Electron Microsc.* **1**, 33-40.
- Johnson, D. W. (1975). *A Fourier method for numerical Kramers-Kronig analysis. J. Phys. A*, **8**, 490-495.
- Johnson, D. W. & Spence, J. C. H. (1974). *Determination of the single scattering probability distribution from plural scattering data. J. Phys. D*, **7**, 771-780.
- Jouffrey, B., Sevely, J., Zanchi, G. & Kihn, Y. (1985). *Characteristic energy losses with high energy electrons up to 2.5 MeV. Scanning Electron Microsc.* **3**, 1063-1070.
- Keil, P. (1968). *Elektronen-Energieverlustmessungen und Berechnung optischer Konstanten. I. Festes Xenon. Z. Phys.* **214**, 251-265.
- Killat, U. (1974). *Optical properties of  $C_6H_{12}$ ,  $C_6H_{10}$ ,  $C_6H_8$ ,  $C_6H_6$ ,  $C_7H_8$ ,  $C_6H_5Cl$  and  $C_5H_5N$  in the solid and gaseous state derived from electron energy losses. J. Phys. C*, **7**, 2396-2408.
- Klemperer, O. (1965). *Electron beam spectroscopy. Rev. Prog. Phys.* **28**, 77-111.
- Kliwer, K. & Fuchs, R. (1974). *Theory of dynamical properties of dielectric surfaces. Adv. Chem. Phys.* **27**, 355-541.

#### 4. PRODUCTION AND PROPERTIES OF RADIATIONS

##### 4.3.4 (cont.)

- Krahl, D. & Herrmann, K. H. (1980). *Experiments with an imaging energy filter in the CTEM*. *Micron*, **11**, 287–289.
- Krivanek, O. L., Ahn, C. C. & Keeney, R. B. (1987). *Parallel detection electron spectrometer using quadrupole lens*. *Ultramicroscopy*, **22**, 103–115.
- Krivanek, O. L., Manoubi, T. & Colliex, C. (1985). *Sub 1 eV resolution EELS at energy losses greater than 1 keV*. *Ultramicroscopy*, **18**, 155–158.
- Krivanek, O. L. & Swann, P. R. (1981). *An advanced electron energy loss spectrometer. Quantitative microanalysis with high spatial resolution*, pp. 136–140. London: The Metals Society.
- Kröger, E. Z. (1970). *Transition radiation, Čerenkov radiation and energy losses of relativistic charged particles traversing thin foils at oblique incidence*. *Z. Phys.* **235**, 403–421.
- Kuyatt, C. E. & Simpson, J. A. (1967). *Electron monochromator design*. *Rev. Sci. Instrum.* **38**, 103–111.
- Landau, L. & Lifchitz, E. (1966). *Mécanique quantique. Théorie non relativiste*, pp. 632–690. Moscow: Editions Mir.
- Leapman, R. D., Grunes, L. A. & Fejes, P. L. (1982). *Study of the  $L_{23}$  edges in the 3d transition metals and their oxides by electron energy loss spectroscopy with comparisons to theory*. *Phys. Rev. B*, **26**, 614–635.
- Leapman, R. D., Rez, P. & Mayers, D. F. (1980). *K, L and M shell generalized oscillator strengths and ionization cross sections for fast electron collisions*. *J. Chem. Phys.* **72**, 1232–1243.
- Leapman, R. D. & Swyt, C. R. (1988). *Separation of overlapping core edges in EELS spectra by multiple least-squares fitting*. *Ultramicroscopy*, **26**, 393–404.
- Lindhard, J. (1954). *On the properties of a gas of charged particles*. *Dan. Vidensk. Selsk. Mat. Fys. Medd.* **28**, 1–57.
- Lindner, T., Sauer, H., Engel, W. & Kambe, K. (1986). *Near-edge structure in electron energy loss spectra of MgO*. *Phys. Rev. B*, **33**, 22–24.
- Livingood, J. J. (1969). *The optics of dipole magnets*. New York: Academic Press.
- Lytle, F. W., Greigor, R. B. & Panson, A. Y. (1988). *Discussion of X-ray absorption near edge structure: application to Cu in the high  $T_c$  superconductors  $La_{1.8}Sr_{0.2}Cu_4$  and  $YBa_2Cu_3O_7$* . *Phys. Rev. B*, **37**, 1550–1562.
- Maher, D. M. (1979). *Elemental analysis using inner-shell excitations: a microanalytical technique for materials characterization. Introduction to analytical electron microscopy*, edited by J. J. Hren, J. I. Goldstein & D. C. Joy, pp. 259–294. New York: Plenum.
- Manoubi, T., Rez, P. & Colliex, C. (1989). *Quantitative electron energy loss spectroscopy on  $M_{45}$  edges in rare earth oxides*. *J. Electron Spectrosc. Relat. Phenom.* **50**, 1–18.
- Manoubi, T., Tence, M., Walls, M. G. & Colliex, C. (1990). *Curve fitting methods for quantitative analysis in EELS*. *Microsc. Microanal. Microstruct.* **1**, 23–39.
- Manzke, R. (1980). *Wavevector dependence of the volume plasmon of GaAs and InSb*. *J. Phys. C*, **13**, 911–917.
- Maslen, V. M. & Rossouw, C. J. (1983). *The inelastic scattering matrix element and its application to electron energy loss spectroscopy*. *Philos. Mag.* **A47**, 119–130.
- Metherell, A. J. F. (1971). *Energy analysing and energy selecting electron microscopes*. *Adv. Opt. Electron Microsc.* **4**, 263–361.
- Mory, C. & Colliex, C. (1989). *Elemental analysis near the single-atom detection level by processing sequences of energy-filtered images*. *Ultramicroscopy*, **28**, 339–346.
- Mott, N. F. & Massey, H. S. W. (1952). *The theory of atomic collisions*, pp. 224–248. Oxford: Clarendon Press.
- Müller, J. E., Jepsen, O. & Wilkins, J. W. (1982). *X-ray absorption spectra: K edges of 3d transition metals, L edges of 3d and 4d metals and M edges of palladium*. *Solid State Commun.* **42**, 365–368.
- Parker, N. W., Utlaut, M. & Isaacson, M. S. (1978). *Design of magnetic spectrometers with second order aberrations corrected*. *Optik (Stuttgart)*, **51**, 333–351.
- Pearce-Percy, H. T. (1978). *The design of spectrometers for energy loss spectroscopy*. *Scanning Electron Microsc.* **1**, 41–51.
- Powell, C. J. (1976). *Cross sections for ionization of inner-shell electrons by electrons*. *Rev. Mod. Phys.* **48**, 33–47.
- Powell, C. J. (1984). *Inelastic scattering of electrons in solids. Electron beam interactions with solids for microscopy, microanalysis and micro-lithography*, edited by D. F. Kyser, H. Niedrig, D. E. Newbury & R. Shimizu, pp. 19–31. Chicago: SEM, Inc.,
- Powell, C. J. (1989). *Cross sections for inelastic electron scattering in solids*. *Ultramicroscopy*, **28**, 24–31.
- Raether, H. (1965). *Electron energy loss spectroscopy*. *Springer Tracts Mod. Phys.* Vol. 38, pp. 85–170. Berlin: Springer.
- Raether, H. (1980). *Excitation of plasmons and interband transitions by electrons*. *Springer Tracts in Modern Physics*, Vol. 88. Berlin: Springer.
- Rao, C. N., Thomas, J. M., Williams, B. G. & Sparrow, T. G. (1984). *Determination of the number of d-electron states in transition metal compounds*. *J. Phys. Chem.* **88**, 5769–5770.
- Rask, J. H., Miner, B. A. & Buseck, P. (1987). *Determination of manganese oxidation states in solids by EELS*. *Ultramicroscopy*, **21**, 321–326.
- Reimer, L. & Rennekamp, R. (1989). *Imaging and recording of multiple scattering effects by angular resolved electron energy loss spectroscopy*. *Ultramicroscopy*, **28**, 258–265.
- Rez, P. (1989). *Inner shell spectroscopy: an atomic view*. *Ultramicroscopy*, **28**, 16–23.
- Ritchie, R. H. (1957). *Plasmon losses by fast electrons in thin films*. *Phys. Rev.* **106**, 874–881.
- Rose, H. & Plies, E. (1974). *Entwurf eines fehlerarmen magnetischen Energie Analysators*. *Optik (Stuttgart)*, **40**, 336–341.
- Rose, H. & Spehr, R. (1980). *On the theory of the Boersch effect*. *Optik (Stuttgart)*, **57**, 339–364.
- Sayers, D. E., Stern, E. A. & Lytle, F. W. (1971). *New technique for investigating noncrystalline structures: Fourier analysis of the extended X-ray absorption fine structure*. *Phys. Rev. Lett.* **27**, 1204–1207.
- Schattschneider, P. (1983). *A performance test of the recovery of single energy loss profiles via matrix analysis*. *Ultramicroscopy*, **11**, 321–322.
- Schattschneider, P. (1989). *The dielectric description of inelastic electron scattering*. *Ultramicroscopy*, **28**, 1–15.
- Scheinfein, M. & Isaacson, M. S. (1984). *Design and performance of second order aberration corrected spectrometers for use with the scanning transmission electron microscope*. *Scanning Electron Microsc.* **4**, 1681–1696.
- Scheinfein, M. & Isaacson, M. S. (1986). *Electronic and chemical analysis of fluoride interface structures at subnanometer spatial resolution*. *J. Vac. Sci. Technol.* **B4**, 326–332.
- Schnatterly, S. E. (1979). *Inelastic electron scattering spectroscopy*. *Solid State Phys.* **14**, 275–358.
- Schröder, B. & Geiger, J. (1972). *Electron spectrometric study of amorphous germanium and silicon in the two phonon region*. *Phys. Rev. Lett.* **28**, 301–303.

## REFERENCES

## 4.3.4 (cont.)

- Sevely, J. (1985). *Voltage dependence in electron energy loss spectroscopy*. *Inst. Phys. Conf. Ser.* **78**, 155–160.
- Shiles, E., Sazaki, T., Inokuti, M. & Smith, D. Y. (1980). *Self consistency and sum-rule tests in the Kramers Kronig analysis of optical data: applications to aluminium*. *Phys. Rev. B*, **22**, 1612–1628.
- Shuman, H. (1980). *Correction of the second order aberrations of uniform field magnetic sections*. *Ultramicroscopy*, **5**, 45–53.
- Shuman, H. & Kruit, P. (1985). *Quantitative data processing of parallel recorded electron energy-loss spectra with low signal to background*. *Rev. Sci. Instrum.* **56**, 231–239.
- Shuman, H. & Somlyo, A. P. (1987). *Electron energy loss analysis of near-trace-element concentrations of calcium*. *Ultramicroscopy*, **21**, 23–32.
- Spence, J. C. H. (1979). *Uniqueness and the inversion problem of incoherent multiple scattering*. *Ultramicroscopy*, **4**, 9–12.
- Spence, J. C. H. (1981). *The crystallographic information in localized characteristic-loss electron images and diffraction patterns*. *Ultramicroscopy*, **7**, 59–64.
- Spence, J. C. H. (1988). *Inelastic electron scattering: Parts I and II. High resolution transmission electron microscopy and associated techniques*, edited by P. R. Buseck, J. M. Cowley & L. Eyring, pp. 129–189. Oxford University Press.
- Spence, J. C. H. & Taftø, J. (1983). *ALCHEMI: a new technique for locating atoms in small crystals*. *J. Microsc.* **130**, 147–154.
- Stohr, J., Sette, F. & Johnson, A. L. (1984). *Near edge X-ray absorption fine structure studies of chemisorbed hydrocarbons: bond lengths with a ruler*. *Phys. Rev. Lett.* **53**, 1684–1687.
- Strauss, M. G., Naday, Y., Sherman, I. S. & Zaluzec, N. J. (1987). *CCD base parallel detection system for EELS spectroscopy and imaging*. *Ultramicroscopy*, **22**, 117–124.
- Sturm, K. (1982). *Electron energy loss in simple metals and semiconductors*. *Adv. Phys.* **31**, 1–64.
- Swyt, C. R. & Leapman, R. D. (1982). *Plural scattering in electron energy loss analysis*. *Scanning Electron Microsc.* **1**, 73–82.
- Taftø, E. A. & Philipp, H. R. (1965). *Optical properties of graphite*. *Phys. Rev. A*, **138**, 197–202.
- Taftø, J. & Krivanek, O. L. (1982). *Site specific valence determination by EELS*. *Phys. Rev. Lett.* **48**, 560–563.
- Taftø, J. & Zhu, J. (1982). *Electron energy-loss near edge structure (ELNES), A potential technique in the studies of local atomic arrangements*. *Ultramicroscopy*, **9**, 349–354.
- Teo, B. K. & Joy, D. C. (1981). *EXAFS spectroscopy techniques and applications*. New York: Plenum.
- Thole, B. T., van der Laan, G., Fuggle, J. C., Sawatsky, G. A., Karnatak, R. C. & Esteve, J. M. (1985). *3d X-ray absorption lines and the  $3d^9 4f^{n+1}$  multiplets of the lanthanides*. *Phys. Rev. B*, **32**, 5107–5118.
- Tossel, J. A., Vaughan, D. J. & Johnson, K. H. (1974). *The electronic structure of rutile, wustite and hematite from molecular orbital calculations*. *Am. Mineral.* **59**, 319–334.
- Trebbia, P. (1988). *Unbiased method for signal estimation in EELS. Concentration measurements and detection limits in quantitative analysis: methods and programs*. *Ultramicroscopy*, **24**, 399–408.
- Venghaus, H. (1975). *Redetermination of the dielectric function of graphite*. *Phys. Status Solidi B*, **71**, 609–614.
- Von Festenberg, C. (1968). *Retardierungseffekte im Energieverlustspektrum von GaP*. *Z. Phys.* **214**, 464.
- Vvedensky, D. D., Saldin, D. K. & Pendry, J. B. (1985). *Azimuthal and polar angle dependence in XANES of low symmetry adsorption sites*. *Surf. Sci.* **162**, 909–912.
- Wehenkel, C. (1975). *Mise au point d'une nouvelle méthode d'analyse quantitative des spectres de pertes d'énergie d'électrons rapides diffusés dans la direction du faisceau incident: application à l'étude des métaux nobles*. *J. Phys. (Paris)*, **36**, 199–207.
- Weng, X. D. & Rez, P. (1989). *Multiple scattering approach to oxygen K near edge structures in EELS spectroscopy of alkaline earths*. *Phys. Rev. B*, **39**, 7405–7412.
- Weng, X. D., Rez, P. & Ma, H. (1989). *Carbon K-shell near-edge structure: multiple scattering and band theory calculations*. *Phys. Rev. B*, **40**, 4175–4178.
- Weng, X. D., Rez, P. & Sankey, O. F. (1989). *Pseudo-atomic orbital band theory applied to EELS near edge structures*. *Phys. Rev. B*, **40**, 5694–5704.
- Wien, W. (1897). *Vert. Deutschen Phys. Res.* **16**, 165.
- Williams, B. G. & Bourdillon, A. J. (1982). *Localised Compton scattering using EELS*. *J. Phys. C*, **15**, 6881–6890.
- Williams, B. G., Sparrow, T. G. & Egerton, R. F. (1984). *Electron Compton scattering from solids*. *Proc. R. Soc. London Ser. A*, **393**, 409–422.
- Zaanen, J., Sawatsky, G. A., Fink, J., Speier, W. & Fuggle, J. C. (1985).  *$L_{23}$  absorption spectra of the lighter 3d transition metals*. *Phys. Rev. B*, **32**, 4905–4913.
- Zanchi, G., Perez, J. P. & Sevely, J. (1975). *Adaptation of magnetic filtering device on a one megavolt electron microscope*. *Optik (Stuttgart)*, **43**, 495–501.
- Zanchi, G., Sevely, J. & Jouffrey, B. (1977). *Second order image aberration of a one megavolt magnetic filter*. *Optik (Stuttgart)*, **48**, 173–192.
- Zimmermann, S. (1976). *The dielectric function of InSb determined by electron energy losses*. *J. Phys. C*, **9**, 2643–2649.

## 4.3.5

- Barrett, C. S. & Massalski, T. B. (1980). *Structure of metals*, 3rd revised ed. Oxford: Pergamon Press.
- Bernal, J. D. (1926). *On the interpretation of X-ray single-crystal rotation photographs*. *Proc. R. Soc. London Ser. A*, **113**, 117–160.
- Bunge, H.-J. (1982). *Texture analysis in materials science*. London: Butterworth.
- Gritsaenko, G. S., Zvyagin, B. B., Boyarskaya, R. V., Gorshkov, A. I., Samotoin, N. D. & Frolova, K. E. (1969). *Methods of electron microscopy of minerals*. Moscow: Nauka.
- Guinier, A. (1956). *Théorie et technique de la radiocristallographie*, 2nd ed. Paris: Dunod.
- Kakudo, M. & Kasai, N. (1972). *X-ray diffraction by polymers*. Tokyo: Kodansha; Amsterdam: Elsevier.
- Krinsky, G. A. (1975). *On the possibilities to use oriented specimens for recording of non-basal X-ray reflexions of fine-grained layer silicates*. *Crystal chemistry of minerals and geological problems*, pp. 132–138. Moscow: Nauka.
- Mamy, J. & Gaultier, J.-P. (1976). *Evolution structurale de la montmorillonite associée au phénomène de fixation irréversible du potassium*. *An. Agron.* **27**(1), 1–16.
- Méring, J. (1949). *L'interférence des rayons X dans les systèmes à stratification désordonnée*. *Acta Cryst.* **2**, 371–377.
- Pinsker, Z. G. (1953). *Electron diffraction*. London: Butterworth.

## 4. PRODUCTION AND PROPERTIES OF RADIATIONS

### 4.3.5 (cont.)

- Plançon, A., Rousseaux, F., Tchoubar, D., Tchoubar, C., Krinari, G. & Drits, V. A. (1982). *Recording and calculation of  $hk$  rod intensities in case of diffraction by highly oriented powders of lamellar samples*. *J. Appl. Cryst.* **15**, 509–512.
- Vainshtein, B. K. (1964). *Structure analysis by electron diffraction*. Oxford: Pergamon Press.
- Warren, B. E. (1941). *X-ray diffraction in random layer lattices*. *Phys. Rev.* **59**, 693–698.
- Wilson, A. J. C. (1949). *Diffraction by random layers: ideal line profiles and determination of structure amplitudes from observed line profiles*. *Acta Cryst.* **2**, 245–251.
- Wilson, A. J. C. (1962). *X-ray optics*, 2nd ed. London: Methuen.
- Zhukhlistov, A. P., Avilov, A. S., Ferraris, G., Zvyagin, B. B. & Plotnikov, V. P. (1997). *Statistical distribution of hydrogen over three positions in brucite  $Mg(OH)_2$  structure from electron diffractometry data*. *Crystallogr. Rep.* **42**, 774–777.
- Zvyagin, B. B. (1967). *Electron diffraction analysis of clay mineral structures*. New York: Plenum.
- Zvyagin, B. B., Vrublevskaia, Z. V., Zhukhlistov, A. P., Sidorenko, O. V., Soboleva, S. V. & Fedotov, A. F. (1979). *High-voltage electron diffraction in the study of layered minerals*. Moscow: Nauka.
- Zvyagin, B. B., Zhukhlistov, A. P. & Plotnikov, V. P. (1996). *The development of electron diffractometry of minerals. Structural studies of crystals (For the 75th birthday of B. K. Vainshtein)*, pp. 225–234. Moscow: Nauka Physmathgis.

#### 4.3.6.1

- Cowley, J. M. (1975). *Diffraction physics*. New York: North-Holland.
- Goodman, P. & Moodie, A. F. (1974). *Numerical evaluation of  $N$ -beam wave functions in electron scattering by the multislice method*. *Acta Cryst.* **A30**, 280–290.

#### 4.3.6.2

- International Tables for Crystallography* (1996). Vol. B. Dordrecht: Kluwer Academic Publishers.
- Hirsch, P. B., Howie, A., Nicholson, R. B., Pashley, D. W. & Whelan, M. J. (1977). *Electron microscopy of thin crystals*. New York: Krieger.
- Howie, A. & Basinski, Z. S. (1968). *Approximations of the dynamical theory of diffraction contrast*. *Philos. Mag.* **17**, 1039–1063.
- Humphreys, C. J. & Hirsch, P. B. (1968). *Absorption parameters in electron diffraction theory*. *Philos. Mag.* **18**, 115–122.
- Jones, P. M., Rackham, G. M. & Steeds, J. W. (1977). *High-order Laue zone electron diffraction*. *Proc. R. Soc. London Ser. A*, **354**, 192–222.
- Pendry, J. B. (1974). *Low energy electron diffraction*. New York: Academic Press.

#### 4.3.7

- Ackermann, I. (1948). *Observations on the dynamical interference phenomena in convergent electron beams. II*. *Ann. Phys. (Leipzig)*, **2**, 41–54.

- Andersson, B. (1975). *Structure analysis of the  $\gamma$ -phase in the vanadium oxide system by electron diffraction studies*. *Acta Cryst.* **A31**, 63–70.
- Ando, Y., Ichimiya, A. & Uyeda, R. (1974). *A determination of values and signs of the 111 and 222 structure factors of silicon*. *Acta Cryst.* **A30**, 600–601.
- Bird, D. M. (1990). *Absorption in high-energy electron diffraction from non-centrosymmetrical crystals*. *Acta Cryst.* **A46**, 208–214.
- Bird, D. M. & Saunders, M. (1992). *Inversion of convergent-beam electron diffraction patterns*. *Acta Cryst.* **A48**, 555–562.
- Blake, R. G., Jostsons, A., Kelly, P. M. & Napier, J. G. (1978). *The determination of extinction distances and anomalous absorption coefficients by scanning electron microscopy*. *Philos. Mag.* **A37**, 1–16.
- Buxton, B. F. (1976). *Bloch waves in high order Laue zone effects in high energy electron diffraction*. *Proc. R. Soc. London Ser. A*, **300**, 335–361.
- Cowley, J. M. (1961). *Diffraction intensities from bent crystals*. *Acta Cryst.* **14**, 920–926.
- Dorset, D. L. (1991). *Is electron crystallography possible? The direct determination of organic crystal structures*. *Ultramicroscopy*, **38**, 23–40.
- Dorset, D. L., Jap, B. K., Ho, M. M. & Glaeser, R. M. (1979). *Direct phasing of electron diffraction data from organic crystals: the effect of  $n$ -beam dynamical scattering*. *Acta Cryst.* **A35**, 1001–1009.
- Fox, A. G. & Fisher, R. M. (1988). *A summary of low-angle X-ray atomic scattering factors measured by the critical voltage effect in high energy electron diffraction*. *Aust. J. Phys.* **41**, 461–468.
- Fox, A. G. & Tabernor, M. A. (1991). *The bonding charge density of  $\beta'$ -NiAl'*. *Acta Metall.* **39**, 669–678.
- Fujiyoshi, Y., Mizusaki, T., Morikawa, K., Yamagishi, H., Aoki, Y., Kihara, H. & Harada, Y. (1991). *Development of a superfluid helium stage for high-resolution electron microscopy*. *Ultramicroscopy*, **38**, 241–251.
- Fukuhara, A. (1966). *Many-ray approximation in the dynamical theory of electron diffraction*. *J. Phys. Soc. Jpn*, **21**, 2645–2662.
- Gjønnnes, J. & Høier, R. (1971). *The application of non-systematic many-beam dynamic effects to structure-factor determination*. *Acta Cryst.* **A27**, 313–316.
- Gjønnnes, K. & Bøe, N. (1994). *Refinement of temperature factors and charge distributions in  $YBa_2Cu_3O_7$  and  $YBa_2(Cu,Co)_3O_7$  from CBED intensities*. *Micron Microsc. Acta*, **25**, 29–44.
- Glazer, J., Ramesh, R., Hilton, M. R. & Sarikaya, M. (1985). *Comparison of convergent beam electron diffraction methods for determination of foil thickness*. *Philos. Mag.* **A52**, 59–63.
- Goodman, P. (1976). *Examination of the graphite structure using convergent-beam electron diffraction*. *Acta Cryst.* **A32**, 793–798.
- Goodman, P. & Lehmpfuhl, G. (1967). *Electron diffraction study of  $MgO$   $h00$  systematic interactions*. *Acta Cryst.* **22**, 14–24.
- Høier, R. (1972). *Displaced lines in Kikuchi patterns*. *Phys. Status Solidi A*, **11**, 597–610.
- Høier, R., Bakken, L. N., Marthinsen, K. & Holmestad, R. (1993). *Structure factor determination in non-centrosymmetrical crystals by a two-dimensional CBED-based multiparameter refinement method*. *Ultramicroscopy*, **49**, 159–170.
- Holmestad, R., Weickenmeier, A. L., Zuo, J. M., Spence, J. C. H. & Horita, Z. (1993). *Debye–Waller factor measurement in TiAl from HOLZ reflections*. *Electron microscopy and analysis 1993*, pp. 141–144. Bristol: IOP Publishing.

## REFERENCES

## 4.3.7 (cont.)

- Howie, A. (1963). *Inelastic scattering of electrons by crystals. I. The theory of small angle inelastic scattering. Proc. R. Soc. London Ser. A*, **271**, 268–287.
- Kambe, K. (1957). *Study of simultaneous reflections in electron diffraction by crystals. J. Phys. Soc. Jpn*, **12**, 13–36.
- Kelly, P. M., Jostsons, A., Blake, R. G. & Napier, J. G. (1975). *The determination of foil thickness by scanning transmission electron microscopy. Phys. Status Solidi A*, **31**, 771–780.
- Kogiso, M. & Takahashi, H. (1977). *Group-theoretical method in the many-beam theory in electron diffraction. J. Phys. Soc. Jpn*, **42**, 223–229.
- Krahl, D., Pätzold, H. & Swoboda, M. (1990). *An aberration-minimized imaging energy filter of simple design. Proceedings of 12th International Conference on Electron Microscopy 1990, Vol. 2*, pp. 60–61.
- Krivanek, O. L., Gubbens, A. J., Dellby, N. & Meyer, C. E. (1991). *Design and first applications of a post-column imaging filter. Microsc. Microanal. Microstruct. (France)*, **3**, 187–199.
- Krivanek, O. L., Mooney, P. E., Fan, G. Y., Leber, M. L. & Meyer, C. E. (1991). *Slow-scan CCD cameras for transmission electron microscopy. Electron microscopy and analysis 1991*, pp. 523–526. Bristol: IOP Publishing.
- Kühlbrandt, W., Wang, D. N. & Fujiyoshi, Y. (1994). *Atomic model of plan light-harvesting complex by electron crystallography. Nature (London)*, **367**, 614–621.
- Lehmpfuhl, G. (1974). *Dynamical interaction of electron waves in a perfect single crystal. Z. Naturforsch. Teil A*, **27**, 424–433.
- Ma, Y., Rømming, C., Lebeck, B. & Gjønnnes, J. (1992). *Structure refinement of  $Al_3Zr$  using single-crystal X-ray diffraction, powder neutron diffraction and CBED. Acta Cryst.* **B48**, 11–16.
- Marthinsen, K., Holmestad, R. & Høier, R. (1994). *Analytical filtering of low-angle inelastic scattering contributions to CBED contrast. Ultramicroscopy*, **55**, 268–275.
- Matsuhata, H. & Gjønnnes, J. (1994). *Bloch-wave degeneracies and non-systematic critical voltage: a method for structure-factor determination. Acta Cryst.* **A50**, 107–115.
- Matsuhata, H. & Steeds, J. W. (1987). *Observation of accidental Bloch-wave degeneracies of zone-axis critical voltage. Philos. Mag.* **B55**, 39–54.
- Matsuhata, H., Tomokiyo, Y., Watanabe, H. & Eguchi, T. (1984). *Determination of the structure factors of Cu and  $Cu_3Au$  by the intersecting Kikuchi-line method. Acta Cryst.* **B40**, 544–549.
- Mori, N., Oikawa, T. & Harada, Y. (1990). *Development of the imaging plate for the transmission electron microscope and its characteristics. J. Electron Microsc. (Japan)*, **39**, 433–436.
- Olsen, A., Goodman, P. & Whitfield, H. (1985).  *$Tl_3SbS_3$ ,  $Tl_3SbSe_3$ ,  $Tl_3Sb_{3-x}Se_x$  and  $Tl_3Sb_yAs_{1-y}Se_3$ . J. Solid State Chem.* **60**, 305–315.
- Saunders, M., Bird, D. M., Midgley, P. A. & Vincent, R. (1994). *Structure factor refinement by zone-axis CBED pattern matching. Proceedings of 13th International Congress on Electron Microscopy, Paris, France, 17–22 July 1994, Vol. 1*, pp. 847–848.
- Spargo, A. E. C. (1994). *Electron crystallography and crystal structure. Proceedings of 13th International Congress on Electron Microscopy, Paris, France, 17–22 July 1994, Vol. 1*, pp. 959–960.
- Spence, J. C. H. & Zuo, J. M. (1992). *Electron microdiffraction*. New York: Plenum.
- Steeds, J. W. (1984). *Further development in the analysis of convergent beam electron diffraction (CBED) data. EMAG 1983. Inst. Phys. Conf. Ser. No. 69*, pp. 31–36.
- Taftø, J. & Gjønnnes, J. (1985). *The intersecting Kikuchi line technique: critical voltage at any voltage. Ultramicroscopy*, **17**, 329–334.
- Taftø, J. & Metzger, T. H. (1985). *Large-angle convergent-beam electron diffraction; a simple technique for the study of modulated structures with application to  $V_2D$ . J. Appl. Cryst.* **18**, 110–113.
- Tanaka, M. & Tsuda, K. (1990). *Determination of positional parameters by convergent-beam electron diffraction. Proceedings of 12th International Congress on Electron Microscopy 1990, Vol. 2*, pp. 518–519.
- Terasaki, O., Watanabe, D. & Gjønnnes, J. (1979). *Determination of crystal structure factor of Si by the intersecting-Kikuchi-line method. Acta Cryst.* **A35**, 895–900.
- Unwin, P. N. T. & Henderson, R. J. (1975). *Three-dimensional model of purple membrane obtained by electron microscopy. Mol. Biol.* **94**, 425–430.
- Vincent, R., Bird, D. M. & Steeds, J. W. (1984). *Structure of AuGeAs determined by convergent beam electron diffraction. II. Refinement of structural parameters. Philos. Mag.* **A50**, 765–786.
- Vincent, R. & Midgley, P. A. (1994). *Double conical beam-rocking system for measurement of integrated electron diffraction intensities. Ultramicroscopy*, **53**, 271–284.
- Voigt-Martin, I. G., Yan, D. H., Gilmore, C. J., Shankland, K. & Bricogne, G. (1994). *The use of maximum entropy and likelihood ranking to determine the crystal structure of 4-[4'-(N-dimethylamino)benzylidene]pyrazolidine-3,5-dione at 1.4 Å resolution from electron diffraction and high-resolution electron microscopy image data. Ultramicroscopy*, **56**, 271–288.
- Voss, R., Lehmpfuhl, G. & Smith, D. J. (1980). *Influence of doping on the crystal potential of silicon investigated by the convergent beam electron diffraction technique. Z. Naturforsch. Teil A*, **35**, 973–984.
- Watanabe, D., Uyeda, R. & Fukuhara, A. (1969). *Determination of the atomic form factor by high-voltage electron diffraction. Acta Cryst.* **A25**, 138–140.
- Zou, X. D., Sukharev, Y. & Hovmöller, S. (1993). *ELD – a computer program for extracting intensities from electron diffraction patterns. Ultramicroscopy*, **49**, 147–158.
- Zuo, J. M., Høier, R. & Spence, J. C. H. (1989). *Three-beam and many-beam theory in electron diffraction and its use for structure-factor phase determination in non-centrosymmetrical crystal structures. Acta Cryst.* **A45**, 839–851.
- Zuo, J. M., Spence, J. C. H., Downs, J. & Mayer, J. (1993). *Measurement of individual structure-factor phases with tenth-degree accuracy: the 00.2 reflection in BeO studied with electron and X-ray diffraction. Acta Cryst.* **A49**, 422–429.

## 4.3.8

- Alexander, H., Spence, J. C. H., Shindo, D., Gottschalk, H. & Long, N. (1986). *Forbidden reflection lattice imaging for the determination of kink densities on partial dislocations. Philos. Mag.* **A53**, 627–643.
- Anstis, G. R., Lynch, D. F., Moodie, A. F. & O'Keefe, M. A. (1973). *n-Beam lattice images. III. Upper limits of ionicity in  $W_4Nb_{26}P_{77}$ . Acta Cryst.* **A29**, 138–147.
- d'Anterroches, C. & Bourret, A. (1984). *Atomic structure of [011] and [001] near-coincident tilt boundaries in germanium and silicon. Philos. Mag.* **A49**, 783–807.



#### 4. PRODUCTION AND PROPERTIES OF RADIATIONS

##### 4.3.8 (cont.)

- Binnig, G., Rohrer, H., Gerber, C. & Weibel, E. (1983). *Direct imaging of semiconductor surfaces*. *Phys. Rev. Lett.* **50**, 120–123.
- Budinger, T. F. & Glaeser, R. M. (1976). *Measurement of focus and spherical aberration of an electron microscope objective lens*. *Ultramicroscopy*, **2**, 31–41.
- Cherns, D. (1974). *Direct resolution of surface steps by transmission electron microscopy*. *Philos. Mag.* **30**, 549–557.
- Cockayne, D. J. H. & Gronsky, R. (1981). *Lattice fringe imaging of modulated structures*. *Philos. Mag.* **A44**, 159–175.
- Cowley, J. M. (1959). *The electron-optical imaging of crystal lattices*. *Acta Cryst.* **12**, 367–375.
- Cowley, J. M. (1969). *Image contrast in transmission scanning electron microscope*. *Appl. Phys. Lett.* **15**, 58–59.
- Cowley, J. M. (1981). *Diffraction physics*, 2nd ed. New York: North-Holland.
- Cowley, J. M. (1988). *Electron microscopy of crystals with time-dependent perturbations*. *Acta Cryst.* **A44**, 847–853.
- Cowley, J. M. (1992). *Coherent convergent beam diffraction. Electron diffraction techniques*, Vol. 1, edited by J. M. Cowley, pp. 439–464. Oxford University Press.
- Cowley, J. M. (1994). *Applications of electron holography*. In *Handbook of advanced materials testing*, edited by N. P. Cheremisinoff & P. N. Cheremisinoff. New York: Marcel Dekker, Inc.
- Cowley, J. M. & Iijima, S. (1972). *Electron microscope image contrast for thin crystals*. *Z. Naturforsch. Teil A*, **27**, 445–451.
- Cowley, J. M. & Moodie, A. F. (1960). *Fourier images IV: the phase grating*. *Proc. Phys. Soc. (London)*, **76**, 378–384.
- Cowley, J. M., Spence, J. C. & Smirnov, V. V. (1997). *The enhancement of electron microscope resolution by the use of atomic focusers*. *Ultramicroscopy*, **68**, 135–148.
- Crewe, A. V. & Wall, J. (1970). *A scanning microscope with 5 Å resolution*. *J. Mol. Biol.* **48**, 375–393.
- Daberkow, I., Herrman, K., Liu, L. & Rau, W. (1991). *Performance of electron image converters with YAG and CCD*. *Ultramicroscopy*, **38**, 215–224.
- Desseaux, J., Renault, A. & Bourret, A. (1977). *Multibeam lattice images from germanium oriented in (001)*. *Philos. Mag.* **35**, 357–363.
- Dorset, D. L. (1994). *Electron crystallography of organic molecules*. *Adv. Electron. Electron Phys.* **88**, 111–197.
- Dorset, D. L. (1995). Editor. *Structural electron crystallography*. New York/London: Plenum Press.
- Dorset, D. L., McCourt, M. P., Fryer, J. R., Tivol, W. F. & Turner, J. N. (1994). *The tangent formula in electron crystallography. Phase determination of copper perchlorophthalocyanine*. *Microsc. Soc. Am. Bull.* **24**, 398–404.
- Downing, K. H., Meisheng, H., Wenk, H. R. & O'Keefe, M. A. (1990). *Resolution of oxygen atoms in staurolite by three dimensional transmission electron microscopy*. *Nature (London)*, **348**, 525.
- Endoh, H., Hashimoto, H. & Makita, Y. (1994). *Theoretical and observed images of impurity atoms formed by L-shell ionization*. *Ultramicroscopy*, **56**, 108–120.
- Fejes, P. L. (1977). *Approximations for the calculation of high-resolution electron-microscope images of thin films*. *Acta Cryst.* **A33**, 109–113.
- Fields, P. M. & Cowley, J. M. (1978). *Computed electron microscope images of atomic defects in f.c.c. metals*. *Acta Cryst.* **A34**, 103–112.
- Fitzgerald, J. D. & Johnson, A. W. S. (1984). *A simplified method of electron microscope voltage measurement*. *Ultramicroscopy*, **12**, 231–236.
- Frank, J. (1975). *A practical resolution criterion in optics and electron microscopy*. *Optik (Stuttgart)*, **43**, 25–34.
- Frank, J. (1980). *The role of correlation techniques in computer image processing. Computer processing of electron microscope images. Topics in current physics*, Vol. 13, edited by P. W. Hawkes, p. 187. Berlin/Heidelberg/New York: Springer Verlag.
- Fryer, J. R. & Gilmore, C. J. (1992). *Structure determination by electron crystallography*. *Trans. Am. Crystallogr. Assoc.* **28**, 57–75.
- Fu, Z. Q., Huang, D. X., Li, F. H., Li, J. Q., Zhao, Z. X., Cheng, T. Z. & Fan, H. F. (1994). *Incommensurate modulation in minute crystals revealed by combining high-resolution electron microscopy and electron diffraction*. *Ultramicroscopy*, **54**, 229–236.
- Fujiyoshi, Y., Ishizuka, K., Tsuji, M., Kobayashi, T. & Uyeda, N. (1983). *Charge density distribution from high resolution molecular images*. Proceedings of the 17th International Conference on High Voltage Electron Microscopy, p. 21.
- Fukuhara, A. (1966). *Many-ray approximation in the dynamical theory of electron diffraction*. *J. Phys. Soc. Jpn*, **21**, 2645–2662.
- Gabor, D. (1948). *A new microscope principle*. *Nature (London)*, **161**, 777–778.
- Gabor, D. (1949). *Microscopy of reconstructed wavefronts*. *Proc. R. Soc. London Ser. A*, **197**, 454–487.
- Grinton, G. R. & Cowley, J. M. (1971). *Phase and amplitude contrast in electron micrographs of biological materials*. *Optik (Stuttgart)*, **34**, 221–233.
- Haider, M. & Zach, J. (1995). *Multipole correctors. Proceedings of Microscopy and Microanalysis*, edited by G. Bailey, pp. 596–567. New York: Jones and Bigell.
- Hashimoto, H., Mannami, M. & Naiki, T. (1961). *Theory of lattice images*. *Philos. Trans. R. Soc. London*, **253**, 459–489.
- Hirsch, P. B., Howie, A., Nicholson, R. B., Pashley, D. W. & Whelan, M. J. (1977). *Electron microscopy of thin crystals*, p. 190. London: Butterworth.
- Horiuchi, S. (1982). *Reduction in a niobium tungsten bronze*. *J. Appl. Cryst.* **15**, 323–329.
- Howie, A. (1979). *Image contrast and localized signal selection techniques*. *J. Microsc. (Oxford)*, **117**, 11–23.
- Iijima, S. (1977). *High resolution electron microscopy of phase objects: observation of small holes and steps on graphite crystals*. *Optik (Stuttgart)*, **47**, 437–452.
- International Tables for Crystallography* (1992). Vol. B. Dordrecht: Kluwer Academic Publishers.
- Ishizuka, K. (1982). *Multislice formula for inclined illumination*. *Acta Cryst.* **A38**, 773–779.
- Jap, B. K. & Glaeser, R. M. (1978). *The scattering of high energy electrons*. *Acta Cryst.* **A34**, 94–102.
- Kambe, K. (1982). *Visualization of Bloch waves of high energy electrons in high resolution electron microscopy*. *Ultramicroscopy*, **10**, 223–228.
- Kirkland, A., Saxton, W., Chau, K., Tsuno, K. & Kawasaki, M. (1995). *Super-resolution by aperture synthesis*. *Ultramicroscopy*, **57**, 355–374.
- Kobayashi, T., Fujiyoshi, Y. & Uyeda, N. (1982). *The observation of molecular orientations in crystal defects and the growth mechanism of thin phthalocyanine films*. *Acta Cryst.* **A38**, 356–362.

## REFERENCES

## 4.3.8 (cont.)

- Koike, H., Kobayashi, K., Ozawa, S. & Yagi, K. (1989). *High resolution reflection electron microscopy of Si(111) 7 × 7 surfaces using a high voltage electron microscope*. *Jpn. J. Appl. Phys.* **28**, 861–865.
- Komoda, T. (1964). *On the resolution of the lattice image in the electron microscope*. *Optik (Stuttgart)*, **21**, 94–110.
- Krivanek, O. L. (1976). *A method for determining the coefficient of spherical aberration from a single electron micrograph*. *Optik (Stuttgart)*, **45**, 97–101.
- Krivanek, O. L., Dellby, N., Spence, A. J., Camps, R. A. & Brown, L. M. (1997). *Aberration correction in the STEM*. *Proc EMAG 1997*, edited by S. McVitie. London: Institute of Physics.
- Krivanek, O. L. & Mooney, P. E. (1993). *Applications of slow-scan CCD cameras in HREM*. *Ultramicroscopy*, **49**, 95–108.
- Larsen, P. K. & Dobson, P. J. (1988). Editors. *Reflection high energy electron diffraction and reflection electron imaging of surfaces*. *NATO ASI Series*. New York/London: Plenum Press.
- Lichte, H. (1991). *Electron image plane off-axis holography of atomic structures*. *Adv. Opt. Electron Microsc.* **12**, 25–91.
- Lovey, F. C., Coene, W., Van Dyck, D., Van Tendeloo, G., Van Landuyt, J. & Amelinckx, S. (1984). *HREM imaging conditions for stacking sequences in 18R martensite of Cu–Al alloys*. *Ultramicroscopy*, **15**, 345–356.
- Lynch, D. F., Moodie, A. F. & O’Keefe, M. A. (1975). *n-Beam lattice images. V. The use of the charge-density approximation in the interpretation of lattice images*. *Acta Cryst.* **A31**, 300–307.
- Marks, L. (1986). *High resolution electron microscopy of surfaces*. In *Topics in current physics*, Vol. 41. *Structure and dynamics of surfaces. I*, edited by W. Schommers & P. Von Blakenhagen. Berlin/Heidelberg: Springer Verlag.
- Menter, J. W. (1956). *The resolution of crystal lattices*. *Proc. R. Soc. London Ser. A*, **236**, 119.
- Möllenstedt, G. & Düker, H. (1956). *Beobachtungen und Messungen an Biprisma-Interferenzen mit Elektronenwellen*. *Z. Phys.* **145**, 377–397.
- Moodie, A. F. & Warble, C. E. (1967). *The observation of primary step growth in magnesium oxide by direct transmission electron microscopy*. *Philos. Mag.* **16**, 891–904.
- Nagakura, S., Nakamura, Y. & Suzuki, T. (1982). *Forbidden reflection intensity in electron diffraction and its influence on the crystal structure image*. *Jpn. J. Appl. Phys.* **21**, L449–L451.
- Nellist, P., McCallum, B. & Rodenburg, J. (1995). *Resolution beyond the information limit in STEM*. *Nature (London)*, **374**, 630–632.
- O’Keefe, M. A., Spence, J. C. H., Hutchinson, J. L. & Waddington, W. G. (1985). *Proc. 43rd EMSA Meeting*, p. 64. San Francisco: San Francisco Press. [See also H. Hashimoto in *Ultramicroscopy* (1985), **18**, 19–32.]
- Olsen, A. & Spence, J. C. H. (1981). *Distinguishing dissociated glide and shuffle set dislocations by high resolution electron microscopy*. *Philos. Mag.* **A43**, 945–965.
- Orchowski, A., Rau, W. D. & Lichte, H. (1995). *Electron holography surmounts resolution limit of electron microscopy*. *Phys. Rev. Lett.* **74**, 399.
- Pennycook, S. J. & Jesson, D. E. (1991). *High-resolution Z-contrast imaging of crystals*. *Ultramicroscopy*, **37**, 14–38.
- Pirouz, P. (1974). *Effects of absorption on lattice images*. *Optik (Stuttgart)*, **54**, 69–74.
- Saxton, W. O. (1978). *Computer techniques for image processing in electron microscopy*, pp. 9–19. New York: Academic Press.
- Saxton, W. O. (1980a). *Recovery of specimen information for strongly scattering objects*. In *Computer processing of electron microscopy images. Topics in current physics*, Vol. 13, edited by P. W. Hawkes, p. 35. Berlin/Heidelberg/New York: Springer Verlag.
- Saxton, W. O. (1980b). *Correction of artifacts in linear and nonlinear high resolution electron micrographs*. *J. Microsc. Spectrosc. Electron.* **5**, 665–674.
- Scherzer, O. (1949). *The theoretical resolution limit of the electron microscope*. *J. Appl. Phys.* **20**, 20–29.
- Schiske, P. (1975). *Phase determination from a focal series and the corresponding diffraction pattern in electron microscopy for strongly scattering objects*. *J. Phys. D.* **8**, 1372–1386.
- Self, P. G., O’Keefe, M. A., Buseck, P. R. & Spargo, A. E. C. (1983). *Practical computation of amplitudes and phases in electron diffraction*. *Ultramicroscopy*, **11**, 35–52.
- Shindo, D., Hiraga, K., Oikawa, T. & Mori, N. (1990). *Quantification of electron diffraction with imaging plate*. *J. Electron Microsc.* **39**, 449–453.
- Smith, D. J., Bursill, L. A. & Wood, G. J. (1985). *Non-anomalous high-resolution imaging of crystalline materials*. *Ultramicroscopy*, **16**, 19–32.
- Smith, D. J., Saxton, W. O., O’Keefe, M. A., Wood, G. J. & Stobbs, W. M. (1983). *The importance of beam alignment and crystal tilt in high resolution electron microscopy*. *Ultramicroscopy*, **11**, 263–282.
- Spence, J. C. H. (1988). *High resolution electron microscopy*, 2nd ed. New York: Oxford University Press.
- Spence, J. C. H. (1998). *Direct inversion of dynamical electron diffraction patterns to structure factors*. *Acta Cryst.* **A54**, 7–18.
- Spence, J. C. H. & Lynch, J. (1982). *STEM microanalysis and inelastic imaging in crystals*. *Ultramicroscopy*, **9**, 267–278.
- Spence, J. C. H., O’Keefe, M. A. & Iijima, S. (1978). *On the thickness periodicity of atomic-resolution images of dislocation cores*. *Philos. Mag.* **A38**, 463–482.
- Takayanagi, K. (1984). *Surface structure imaging by electron microscopy*. *J. Microsc.* **136**, 287–298.
- Tonomura, A. (1992). *Electron-holographic interference microscopy*. *Adv. Phys.* **41**, 59–103.
- Treacy, M. M. J. & Rice, S. B. (1989). *Catalyst particle sizes from Rutherford scattered intensities*. *J. Microsc.* **156**, 211–234.
- Unwin, P. N. T. & Henderson, R. (1975). *Molecular structure determination by electron microscopy of unstained crystalline specimens*. *J. Mol. Biol.* **94**, 425–440.
- Van Dyck, D. (1980). *Fast computational procedures for the simulation of structure images in complex or disordered crystals*. *J. Microsc.* **119**, 141.
- Van Dyck, D., Op de Beeck, M. & Coene, W. M. J. (1994). *Information in electron microscopy*. *Microsc. Soc. Am. Bull.* **24**, 427–437.
- Voss, R., Lehmppuhl, G. & Smith, D. J. (1980). *Influence of doping on the crystal potential of silicon*. *Z. Naturforsch. Teil A*, **35**, 973–984.
- Wade, R. H. & Frank, J. (1977). *Electron microscope transfer functions for partially coherent axial illumination*. *Optik (Stuttgart)*, **49**, 81–92.
- Williams, D. B. & Carter, C. B. (1996). *Transmission electron microscopy*. New York: Plenum Press.

#### 4. PRODUCTION AND PROPERTIES OF RADIATIONS

- Wilson, A. R., Spargo, A. E. C. & Smith, D. J. (1982). *The characterisation of instrumental parameters in the high resolution electron microscope*. *Optik (Stuttgart)*, **61**, 63–78.
- Yagi, K. (1993). *RHEED and REM*. In *Electron diffraction techniques*, Vol. 2, edited by J. M. Cowley. IUCr/Oxford University Press.
- Yagi, K. & Cowley, J. M. (1978). *Electron microscopy study of ordering of potassium ions in cubic  $\text{KSbO}_3$* . *Acta Cryst.* **A34**, 625–634.
- Zakharov, N. D., Pasemann, M. & Rozhanski, V. N. (1982). *Observations of point defects in silicon by means of dark-field lattice plane imaging*. *Phys. Status Solidi A*, **71**, 275–281.
- Zuo, J. M., Spence, J. C. H. & O'Keefe, M. A. (1988). *Bonding in GaAs*. *Phys. Rev. Lett.* **61**, 353–356.
- 4.4.2**
- Abrahams, K., Steinsvoll, O., Bongaarts, P. J. M. & De Lange, P. W. (1962). *Reversal of the spin of polarized thermal neutrons without depolarization*. *Rev. Sci. Instrum.* **33**, 524–529.
- Agamalyan, M. M., Drabkin, G. M. & Sbitnev, V. I. (1988). *Spatial spin resonances of polarized neutrons. A tunable slow neutron filter*. *Phys. Rep.* **168**, 265–303.
- Alefeld, B. (1972). *Neutronen-Rückstreuspektrometer*. *Kern-technik*, **14**, 15–17.
- Alefeld, B., Duppich, J., Schärpf, O., Schirmer, A., Springer, T. & Werner, K. (1988). *The new neutron guide laboratory at the FRJ-2 reactor in the KFA Jülich and its special beam forming devices. Thin film neutron optical devices: mirrors, supermirrors, multilayer monochromators, polarizers, and beam guides*, edited by C. F. Majkrzak, pp. 75–83. *SPIE Proc.* No. 983. Bellingham, WA: SPIE.
- Alvarez, L. W. & Bloch, F. (1940). *A quantitative determination of the neutron moment in absolute nuclear magnetons*. *Phys. Rev.* **57**, 111–122.
- Anderson, I. S. (1988). *Neutron beam focusing using supermirrors. Thin film neutron optical devices: mirrors, supermirrors, multilayer monochromators, polarizers, and beam guides*, edited by C. F. Majkrzak, pp. 84–92. *SPIE Proc.* No. 983. Bellingham, WA: SPIE.
- Anderson, I. S. & Høghøj, P. (1996). *New developments in Ni/Ti multilayers*. ILL 1996 Annual Report, pp. 84–85. Institut Laue–Langevin, Grenoble, France
- Bacon, G. E. & Lowde, R. D. (1948). *Secondary extinction and neutron crystallography*. *Acta Cryst.* **1**, 303–314.
- Badurek, G. & Rauch, H. (1978). *Experimental capability study of non-conventional methods in neutron time-of-flight analysis. Neutron Inelastic Scattering Proceedings*, Vol. I, pp. 211–227. Vienna: IAEA.
- Bednarski, S., Dobrzynski, L. & Steinsvoll, O. (1980). *Experimental test on  $\text{Fe}_3\text{Si}(\text{Mn})$  and  $\text{Li}_5\text{Fe}_{2.5}\text{O}_4$  crystals as polarizers for slow neutrons*. *Phys. Scr.* **21**, 217–219.
- Blanc, Y. (1983). *Le spectrometre à temps de vol IN6: caractéristiques techniques et performances*. ILL Internal Report No. 83BL21G. Institut Laue–Langevin, Grenoble, France.
- Bonse, U. & Hart, M. (1965). *Tailless X-ray single crystal reflection curves obtained by multiple reflection*. *Appl. Phys. Lett.* **7**, 238–240.
- Bouchiat, M. A., Carver, T. R. & Varnum, C. M. (1960). *Nuclear polarization in  $^3\text{He}$  gas induced by optical pumping and dipolar exchange*. *Phys. Rev. Lett.* **5**, 373–375.
- Brockhouse, B. N. (1958). *Bull. Am. Phys. Soc.* **3**, 233.
- Bührer, W. (1994). *Triple axis instrument with doubly focusing ('zoom') monochromator and horizontally focusing analyser: seven years experience*. *Nucl. Instrum. Methods*, **A338**, 44–52.
- Carlile, C. J., Hey, P. D. & Mack, B. J. (1977). *High-efficiency Soller slit collimators for thermal neutrons*. *J. Phys. E*, **10**, 543–546.
- Chen, H., Sharov, V. A., Mildner, D. F. R., Downing, R. G., Paul, R. L., Lindstrom, R. M., Zeissler, C. J. & Xiao, Q. F. (1995). *Prompt gamma activation analysis enhanced by a neutron focusing capillary lens*. *Nucl. Instrum. Methods*, **B95**, 107–114.
- Chen-Mayer, H. H., Mildner, D. F. R., Sharov, V. A., Ullrich, J. B., Ponomarev, I. Yu. & Downing, R. G. (1996). *Monolithic polycapillary neutron focusing lenses: experimental characterizations*. *J. Phys. Soc. Jpn.* **65**, Suppl. A, 319–321.
- Christ, J. & Springer, T. (1962). *Über die Entwicklung eines Neutronenleiters am FRM-Reaktor*. *Nukleonik*, **4**, 23–25.
- Chupp, T. E., Coulter, K. P., Hwang, S. R., Smith, T. B. & Welsh, R. C. J. (1996). *Progress toward a spin exchange pumped  $^3\text{He}$  neutron spin filter*. *J. Neutron Res.* **5**, 11–24.
- Colegrove, F. D., Scheerer, L. D. & Walters, K. (1963). *Polarization of  $^3\text{He}$  gas by optical pumping*. *Phys. Rev.* **132**, 2561–2572.
- Colwell, J. F., Miller, P. H. & Whittemore, W. L. (1968). *A new high-efficiency time-of-flight system. Neutron inelastic scattering*, Vol. II, IAEA Conference Proceedings, pp. 429–437. Vienna: IAEA.
- Copley, J. R. D. (1991). *Transmission properties of a counter-rotating pair of disk choppers*. *Nucl. Instrum. Methods*, **A303**, 332–341.
- Curat, R. (1973). *The efficiency of vertically bent neutron monochromators*. *Nucl. Instrum. Methods*, **107**, 21–28.
- Dabbs, J. W. T., Roberts, L. D. & Bernstein, S. (1955). *Direct polarization of  $^{115}\text{In}$  nuclei; J value for 1.456 eV resonance*. Report ORNL-CF-55-5-126. Oak Ridge National Laboratory, TN, USA.
- Dash, J. G. & Sommers, H. S. (1953). *A high transmission slow neutron velocity selector*. *Rev. Sci. Instrum.* **24**, 91–96.
- Delapalme, A., Schweizer, J., Couderchon, G. & Perrier de la Bathie, R. (1971). *Étude de l'alliage Heuser ( $\text{Cu}_2\text{MnAl}$ ) comme monochromateur de neutrons polarisés*. *Nucl. Instrum. Methods*, **95**, 589–594.
- Drabkin, G. M., Okorokov, A. I., Schebetov, A. F., Borovilova, N. V., Kugasov, A. G., Kudriashov, V. A., Runov, V. V. & Korneev, D. A. (1976). *Multilayer Fe-Co mirror polarizing neutron guide*. *Nucl. Instrum. Methods*, **133**, 453–456.
- Drabkin, G. M., Zabidarov, E. I., Kasman, Ya. A. & Okorokov, A. I. (1969). *Investigation of a phase transition in nickel with polarized neutrons*. *Sov. Phys. JETP*, **29**, 261–266.
- Egelstaff, P. A., Cocking, S. J. & Alexander, T. K. (1961). *A four-rotor thermal-neutron analyser. Inelastic scattering of neutrons in solids and liquids*, pp. 165–177. Vienna: IAEA.
- Egorov, A. I., Lobashov, V. M., Nazarenko, V. A., Porsev, G. D. & Serebrov, A. P. (1974). *Production, storage, and polarization of ultracold neutrons*. *Sov. J. Nucl. Phys.* **19**, 147–152.
- Elsenhans, O., Böni, P., Friedli, H. P., Grimmer, H., Buffat, P., Leifer, K., Söchtig, J. & Anderson, I. S. (1994). *Development of Ni/Ti multilayer supermirrors for neutron optics*. *Thin Solid Films*, **246**, 110–119.