LIST OF SYMBOLS – CHAPTER A

R	group symmetry operation
$\mathbf{R}$	double group symmetry operation
ψ_i	basis function
$\Gamma(R)_{ij}^{(n)}$	group representation matrix element
$\rho_{ij}^{(n)}$	group projection operator
$X(R)$	trace of representation, character
φ_k	class of group symmetry operations
$f(\mathbf{r})$	function
E	energy
H	Hamiltonian
$\mathbf{t}, \boldsymbol{\tau}$	real space vector
$\mathbf{a}_i$	lattice basis vector
α	rotational part of group symmetry operation
ε	identity
$\mathbf{L}$	lattice vector
$\mathbf{b}_i$	reciprocal basis vector
$\mathbf{G}, \mathbf{k}$	vector in reciprocal space
G	space group
$\mathbf{D}$	double space group
G^0	point group
T	translation group
G/T	factor group
$G_{\mathbf{k}}$	'small' space group
$G_{\mathbf{k}}^0$	'small' point group
$G_{\mathbf{k}}/T_{\mathbf{k}}$	'small' factor group
θ, ϕ, ψ	Eulerian angles
$D_{1/2}$	spin representation matrices
u_s	spin function
$\boldsymbol{\sigma}$	spin operator
T	time reversal operator
U	unitary operator
K	complex conjugation operator

LIST OF SYMBOLS – CHAPTER B

H	Hamiltonian
$\psi_{n\mathbf{k}}(\mathbf{r})$, $\phi_{n\mathbf{k}}(\mathbf{r})$, $\Phi_{n\mathbf{k}}(\mathbf{r})$	Bloch functions
$\varphi(\mathbf{r})$	Atomic Löwdin function
$\hbar$	Planck's constant
m	effective electron mass
∇	gradient operator
$V(\mathbf{r})$	one electron potential
$\mathbf{r}, \mathbf{R}_l, \boldsymbol{\tau}_\alpha, \mathbf{Q}, \mathbf{d}$	real space vectors
$\mathbf{k}, \mathbf{G}$	reciprocal space vectors
$X_j(\mathbf{r})$	atomic orbital
$R_{\alpha j}(r), u_{\alpha j}(r)$	radial wave function
$\rho(\mathbf{r})$	electron density
S, L	transformation matrices
$j_l(k\,r)$	spherical Bessel function
$Y_{lm}(\theta, \phi)$	spherical harmonic
θ, ϕ	polar angles
$\|c\rangle$	core state
$\|\mathbf{k}\rangle$	plane wave state
$S_\beta(\mathbf{G})$	structure factor
$V_{\beta L}(\mathbf{G})$	form factor
$\boldsymbol{\sigma}$	spin Pauli matrices
$\mathbf{P}_l$	angular projection operator
P_l	Legendre polynomial of order l
P_c	core states projection operator
$G_{\mathbf{k}}(\mathbf{r}, \mathbf{r}')$	Green's function
$n_l(kr)$	spherical Neumann function
$U_j^{(I)}$	free electron wave function
Q	transfer matrix
$H_l^{(1)}$	Hankel function of first kind
ζ	complex variable
$J_{\|M\|}$	Bessel function

LIST OF SYMBOLS – CHAPTER C

$V(q)$	potential Fourier transform form factor
$S(q)$	structure factor
$\varepsilon(q)$	static dielectric function (real part)
$\varepsilon_1(\omega)$	real part of dielectric function
$\varepsilon_2(\omega)$	imaginary part of dielectric function
$\hbar$	Planck's constant
E	energy
ω	light frequency
∇	gradient operator
$U_{\alpha\mathbf{k}}$	periodic part of Bloch function
$\rho(\mathbf{r})$	charge density
$\mathbf{R}_m$	lattice vector
$\mathbf{k}$	reciprocal space vector
$N(E)$	density of states
μ	reduced mass
$\mathbf{A}$	vector potential
$a(\mathbf{r})$	Wannier function
α	anisotropy parameter