**Tables Related Supplement.**

The tables provided in the body of the main document of the article " More Accurate Formulas for Determination of Absolute Atom Concentration Using Electron Energy-Loss Spectroscopy." are given with several digits after the decimal point in this supplement as part of the supplementary information related to this article. The values given in these supplementary tables are deliberately given with several digits after the decimal point to allow one checking the outputs of relevant computer programmes written on the basis of the formulas given in the cited article, e.g. like that provided in the programme source-related supplement.

Table 1: Structures (column two) from (Kittel, 1998) and atom concentrations and electron concentrations of several "free-electron" materials calculated from the structures of column two.

|  |  |  |  |
| --- | --- | --- | --- |
| Material | StructuresCrystal parameter | Atom concentration(1028 at/m3) | Electron concentration(*ne*) (1029 e-/m3) |
| Na | BCC4.225 Å (at 5 K) | 2.65186 | 0.265186 |
| Al | FCC4.05 Å | 6.02136 | 1.806409 |
| Si | FCC-Diamond-like5.430 Å | 4.99678 | 1.998714 |
| In | Tetragonal I3.25, 4.95 Å | 3.82523 | 1.147570 |

Table 2: Plasmon energies, Fermi energies and Fermi vectors for crystalline Na, Al, Si and In calculated with the help of the data of Table 1.

|  |  |  |  |
| --- | --- | --- | --- |
| Material | *Ep* (calculated)(in eV) | *kF*($Å^{-1}$) | *EF*(in eV) |
| Na | 6.04921 | 0.9226 | 3.24545 |
| Al | 15.7882 | 1.7488 | 11.6623 |
| Si | 16.6073 | 1.8088 | 12.4760 |
| In | 12.5838 | 1.5034 | 8.61843 |

Table 3: Calculated plasmon dispersion coefficient (RPA), PCVs (*kc*), plasmon mean free paths, *A*, *Kc*(*A*) and PSCA species for 100 keV incident electrons.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Material | $α\_{RPQ}$ (calc.) |  $k\_{c}$ (Å-1) | $λ\_{p}$ (Å) | $$σ\_{p}^{k}$$(10-22 m2) | *A* | *Kc*(*A*) |
| Na | 0.32191 | 0.750920.8\*0.75‡ | 2742.2$≃$2740 | 1.375135 | -0.6639 | 0.4367 |
| Al | 0.44321 | 1.141441.3\* | 1181.0$≃$1180 | 1.406263 | -0.1538 | 0.4821 |
| Si | 0.45074 | 1.166811.1\* | 1130.1$≃$1130 | 1.770839 | -0.1268 | 0.4851 |
| In | 0.41093 | 1.03418 | 1439.4$≃$1440 | 1.816219 | -0.2601 | 0.4711 |

\* Estimate PCVs from [(Colliex, 2004)](#seven) ; ‡ Calculated PCVs from (vom Felde, 1989).

Table 4: Calculated plasmon dispersion coefficient (ExCor,), PCVs (*kc*),, plasmon mean free paths, *A*, *Kc*(*A*) and PSCA species for 100 keV incident electrons.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Material | ExCor(calc.) | *kc*(Å-1) | *p*(Å) | $$σ\_{p}^{k}$$(10-22 m2) | *A* | *Kc*(*A*) |
| Na | 0.25201 | 0.720300.8\*0.75‡ | 2765.7$≃$2770 | 1.363454 | -0.92446 | 0.41887 |
| Al | 0.39244 | 1.10821.3\* | 1189.0$≃$1190 | 1.396734 | -0.29123 | 0.46809 |
| Si | 0.40082 | 1.13341.1\* | 1137.8$≃$1140 | 1.758977 | -0.26405 | 0.47073 |
| In | 0.35617 | 1.00157 | 1449.7$≃$1450 | 1.803255 | -0.42001 | 0.45627 |

\* Estimate PCVs from ([Colliex, 2004](#Colliex)); ‡ Calculated PCVs from (vom Felde, 1989).

**Table 5**: Electron effective mass (column two), PSCAs for Si (column three) and measured estimates of the plasmon energies (column four)).

|  |  |  |  |
| --- | --- | --- | --- |
| Specimentype |  *m\** = *m0*(10-31 kg) | PSCA ($σ\_{p}^{Si}$)(10-22 m2) | *Ep* (measured)(eV) |
| a-Si | 9.11 | 2.0666667 | $\~$16 $\pm $2 |
| a-Si:H | 9.11 | 2.2627737 | $\~$16 $\pm $2 |

**Table 6a**: Experimental results for the non-hydrogenated specimen. $σ\_{p}^{Si}$ is the experimental PSCA used to obtain the various parameters given in this table as well as those given in Table 6b.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| a-Si | $$σ\_{p}^{Si}$$(10-22 m2) | *Ep*(eV) | *nSi*(1028 m-3) | $$λ\_{p}$$ (Å) | $k\_{c}$ (Å-1) |
| RPA | 2.0666667 | 14.48 | 3.801 | 1270 | 1.10 |
| ExCor | 2.0666667 | 14.40 | 3.754 | 1290 | 1.06 |

**Table 6b**: Other obtained experimental results of the analysis of the a-Si specimen. Technique 1 was used.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| a-Si |  | *kF*(Å-1) | *EF*(eV) | $$θ\_{E}$$(mrad) | $$θ\_{c}$$(mrad) |
| RPA | 0.43 | 1.65824 | 10.48550 | 0.07938 | 6.49436 |
| ExCor | 0.38 | 1.65103 | 10.39452 | 0.07886 | 6.28159 |

**Table 7a**: Part of the experimental results obtained for the hydrogenated Si specimen; i.e. a-Si:H.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| a-Si:H |  $σ\_{p}^{Si}$(10-22 m2) | *Ep*(eV) |  *nSi*(1028 m-3) | *nH* (1028 m-3) | $$σ\_{p}^{H}$$(10-22 m2) | $$\frac{n\_{H}}{n\_{Si}}$$ | $$λ\_{p}$$(Å) | $$k\_{c}$$(Å-1) |
| RPA | 2.2627737 | 16. | 3.786 | 3.409 | 2.51304 | 0.90 | 1170 | 1.15 |
| ExCor | 2.2627737 | 16. | 3.760 | 3.510 | 2.42351 | 0.93 | 1180 | 1.11 |

**Table 7b**: Other obtained results for a-Si:H in both RPA and ExCor cases. Fermi vectors, Fermi energies, characteristic angles *E* and cutoff angles, $θ\_{c}$.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| a-Si:H | *kF*(Å-1) | *EF*(eV) | $$θ\_{E}$$(mrad) | $$θ\_{c}$$(mrad) |
| RPA | 1.76443 | 11.87145 | 0.08712 | 6.76277 |
| ExCor | 1.76443 | 11.87145 | 0.08712 | 6.56719 |

**Table 8:** Data for 100 keV incident electrons: $γ=\left(1-\frac{v^{2}}{c^{2}}\right)^{-\frac{1}{2}}$ where *v*: incident electron velocity; c: speed of light; **: wave length of incident electron wave; $k\_{0}=\frac{2π}{λ}$ is wave number of incident wave.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Acc. voltage(kV) |  | *v*(108 m/s) | (Å) | *k*0(1012 m-1) |
| 100 | 1.1957 | 1.6435 | 0.0370 | 1.6975 |