

## MATERIALS INDEX

### Periodic Tables

10

### Elements

Ag	22, 158, 240, 328–329, 331–332, 342–344, 457, 465, 486	H	7, 9, 14–15, 17, 22, 24–25, 153, 164–165, 215–216, 309, 326, 328–329, 486, 490, 494
Al	50, 60, 153, 157–158, 220, 289, 320, 351, 369–370, 383–385, 465, 491, 494, 499, 501, 514	He	21, 24–25, 153
Ar	344, 347, 397, 430	Hg	116, 196, 486
As	116, 234, 301, 344, 347, 351, 357	I	196, 497
Au	157–158, 311, 341–342, 344, 351, 443, 497	In	351, 513
B	45, 51, 115, 344, 347, 351, 494	Ir	204, 422
Be	21, 24	K	89, 309, 329, 404, 491
Bi	234	La	162
Br	329, 347	Li	21, 24, 89, 212, 328–329, 335, 404, 491
C	112, 122, 195, 205, 311, 351, 374–377, 391–393, 396–397, 486, 490	Mg	331, 465, 494, 499
a-C	32, 116, 276, 345	Mn	75, 162, 329, 496
diamond	13, 20, 33, 70, 89, 99, 153, 158, 426, 435, 437, 474	Mo	344, 432–433, 513
graphite	13, 233, 342–343, 352, 391–393, 397	N	23, 153, 162, 304, 309, 351, 396, 486
C <sub>60</sub>	33, 63, 234, 311	Na	9, 21, 89, 116, 153, 196, 329, 404, 475, 491, 499
nanotube	444	Nb	206, 247, 249
Ca	404	Ne	21, 25, 153
Cd	102, 212	Ni	80–81, 96, 151, 158, 162, 166, 212, 261, 311, 341, 343, 444, 483, 501
Cl	21, 23, 25, 153, 329, 347, 370	O	17, 19, 23, 152, 156–158, 215–216, 309, 341, 351, 360, 395, 453, 466–468, 486, 494
Co	158, 162, 206, 252, 255, 261, 275, 278, 282, 288, 497	Os	497
Cr	13, 75–77, 158, 206	P	45, 115, 162, 234, 344, 347, 351, 486
Cs	89, 329, 466, 492	Pb	17, 22, 158, 212, 247, 249, 329, 344, 486
Cu	24, 48–50, 54, 61–62, 75, 93, 116, 155, 158, 166, 248, 329, 341, 343, 351, 465, 479, 501–502	Pd	158, 162, 341
Dy	282–283	Pt	158, 162, 204, 210, 216, 278, 304, 309, 341, 479
Eu	497	Rb	89, 329, 491
F	21, 23, 153, 328–329, 335, 347, 370, 486	Rh	309, 479
Fe	21, 24, 32, 52, 86, 95, 156–157, 162, 206, 252, 255, 259–262, 264, 273, 278–280, 285, 309, 329, 343, 351, 357, 389–390, 411, 479, 486, 497–498	Ru	204
Ga	351, 357	S	116, 234
Ge	20, 89, 111–112, 116, 118–119, 234, 301, 343–344, 350–351, 356, 360, 499	Sb	52, 234, 334, 351, 497
a-Ge	33	Se	116, 234
		Si	19–20, 25, 45, 50–53, 89, 104–105, 109, 112–114, 117–119, 121–122, 125–126, 128–129, 132, 139, 147, 158, 162, 195, 203, 205, 234, 295–296, 301, 324, 341–344, 347–356, 360–365, 373, 387, 397, 411, 419, 424, 443, 452–453, 465, 468, 475, 486, 491
		Si <sub>2</sub>	53
		Si <sub>3</sub>	53
		a-Si	33, 112–113, 139–140
		poly-Si	114–116, 130–131, 203
		Sn	17, 112, 166, 351, 401, 486, 497
		Sr	158

Ta 158, 206, 591  
 Tb 282–283  
 Te 234, 497  
 Ti 157–158, 206, 239, 369, 372, 390  
 Tl 486  
 W 206, 304, 343–344, 369, 445, 486, 501  
 Y 158, 486  
 Zn 155, 329, 351  
 Zr 162, 206

### Binary compounds and alloys

AgBr 70  
 AgCl 70  
 AgMn 79  
 Al<sub>1-x</sub>Cu<sub>x</sub> 383–384  
 AlMg 276  
 Al<sub>3</sub>Mg<sub>2</sub> 383  
 AlMn 80  
 Al<sub>6</sub>Mn<sub>1-x</sub> 387  
 AlN 20, 26, 158, 205–206, 380  
 Al<sub>2</sub>O<sub>3</sub> 20, 70, 76–77, 94,  
 157–158, 203, 205, 292,  
 342, 369, 383, 396, 398  
 AlP 112  
 AlSi 383  
 AsH<sub>3</sub> 359  
 As<sub>2</sub>S<sub>3</sub> 70, 116  
 Au<sub>0.495</sub>Cd<sub>0.505</sub> 160  
 AuMn 78–79, 83–84  
 Au<sub>x</sub>Si<sub>1-x</sub> 162–163, 171  
 BF<sub>3</sub> 367  
 B<sub>2</sub>H<sub>6</sub> 360  
 BN 20, 112, 120, 158, 205,  
 393–394  
 B<sub>2</sub>O<sub>3</sub> 292, 367  
 BeO 21, 112, 205  
 Bi<sub>2</sub>Te<sub>3</sub> 145  
 CCl<sub>4</sub> 370  
 CF<sub>4</sub> 370  
 a-C:H 360, 432–433  
 (CH)<sub>n</sub> 116  
 CH<sub>4</sub> 9, 15–16, 389–392, 397  
 C<sub>2</sub>H<sub>2</sub> 391–392  
 C<sub>3</sub>H<sub>8</sub> 397  
 CO 309  
 CO<sub>2</sub> 309  
 CaF<sub>2</sub> 356–357  
 CaO 89, 179  
 CdS 284  
 CdTe 112, 117, 284  
 CeH<sub>3</sub> 164  
 CoCr 158, 264, 276  
 Co<sub>x</sub>Ni<sub>1-x</sub> 158, 276  
 Cr<sub>7</sub>C<sub>3</sub> 158  
 CrN 158  
 CrO<sub>2</sub> 264, 273

Cr<sub>2</sub>O<sub>3</sub> 15, 76  
 Cs<sub>3</sub>C<sub>60</sub> 234  
 CsCl 5  
 CuAl<sub>2</sub> 383–385  
 CuBe 383  
 CuCl 13, 409  
 CuFe 83  
 CuMn 79, 83  
 Cu<sub>1-x</sub>Ni<sub>x</sub> 85  
 CuO 13, 22, 116, 214–215, 394  
 CuO<sub>2</sub> 116  
 Cu<sub>2</sub>O 13, 22, 116  
 CuS 214–215  
 CuSn 383  
 Cu<sub>6</sub>Sn<sub>5</sub> 166  
 DyFe<sub>2</sub> 282  
 Fe<sub>x</sub>Al<sub>1-x</sub> 85  
 FeB 389  
 FeB (compound) 271  
 Fe<sub>2</sub>B 389  
 Fe<sub>3</sub>C (cementite) 271, 278, 324–328, 411  
 Fe<sub>1-x</sub>C<sub>x</sub> (steel), 100, 157–158, 374–382,  
 390  
 Fe<sub>65</sub>Co<sub>35</sub> 280  
 FeCr 255  
 FeF<sub>6</sub> 75  
 Fe<sub>2</sub>N 389  
 Fe<sub>3</sub>N 389  
 Fe<sub>4</sub>N 278, 389  
 Fe<sub>x</sub>Ni<sub>1-x</sub> (Permalloy) 253, 264, 278–279,  
 281–282, 376  
 FeNi<sub>3</sub> 279  
 Fe<sub>60</sub>Ni<sub>40</sub> 280  
 Fe<sub>65</sub>Ni<sub>35</sub> 264, 279  
 FeO 22, 89, 278  
 Fe<sub>2</sub>O<sub>3</sub> 22, 157, 264, 272–273,  
 443  
 Fe<sub>3</sub>O<sub>4</sub> 22, 34, 86, 273  
 FeS 214–215, 278  
 FeS<sub>2</sub> 13  
 Fe<sub>1-x</sub>Si<sub>x</sub> 264, 278, 280–281  
 Fe<sub>7</sub>W<sub>6</sub> 3  
 GaAs 26, 111–112, 118–119,  
 122, 126, 129–130, 132,  
 147, 158, 205, 331, 343,  
 356–359, 428, 512  
 118–119, 122  
 GaP 118–119, 122  
 GaSb 439  
 Ge<sub>x</sub>Ag<sub>y</sub> 456  
 GeO<sub>2</sub> 20  
 Ge<sub>x</sub>Si<sub>1-x</sub> 324  
 HF 22, 352, 370  
 H<sub>2</sub>O 17–19, 23, 215–216, 329,  
 360  
 H<sub>2</sub>O<sub>2</sub> 23, 352  
 HfV<sub>2</sub> 223  
 HgS 26, 284  
 HgTe 116, 284

InAs	89, 118	Pb <sub>2</sub> O	22
In <sub>2</sub> O <sub>3</sub>	116	PbO <sub>2</sub>	22
InP	122, 126	PbS	17
InSb	112	PbSn	53
InTl	376	PbTe	145
IrO <sub>2</sub>	204, 210	PdD	223
KC <sub>8</sub>	234	PdH	165, 223
K <sub>3</sub> C <sub>60</sub>	234	Pd <sub>0.8</sub> Si <sub>0.2</sub>	162
KCN	332–333	RhZr <sub>2</sub>	223
KCl	70, 292	RuO <sub>2</sub>	204
LaB <sub>6</sub>	445	Ru <sub>2</sub> O	210
LiBr	214	SiC	20, 26, 53, 116, 122, 131–132, 158, 205, 372, 397, 419
LiCl	214	SiCl <sub>4</sub>	396
LiI	214	a-SiF <sub>x</sub>	371
MgAl	383	SiF <sub>4</sub>	25, 367, 370
Mg <sub>2</sub> Cu	3	SiGe	127, 142, 145, 350, 354–355
MgF <sub>2</sub>	295	a-Si:H	362
MgO	68, 70–71, 89, 158, 210, 342, 396	SiH <sub>4</sub>	353, 360, 362, 370, 396–397
MgS	112	Si <sub>2</sub> H <sub>6</sub>	353
MnF <sub>2</sub>	262	Si <sub>3</sub> N <sub>4</sub>	20, 158, 203, 205, 395–396, 474
MnFe	281	SiO	53
MnO	22, 34, 82	SiO <sub>2</sub>	19–20, 23, 25, 33–34, 70, 94, 122, 131, 203, 205, 210–212, 217, 289, 292, 295, 341, 352, 364–370, 372–373, 396–397, 411, 443, 452, 468, 502
MnO <sub>2</sub>	22, 214–215	SmCo <sub>5</sub>	264, 266, 268–269, 271
Mn <sub>2</sub> O <sub>3</sub>	22	Sm <sub>2</sub> Co <sub>17</sub>	264, 268–269
Mn <sub>3</sub> O <sub>4</sub>	22	SmFe <sub>2</sub>	282–283
MoC	223, 381	SnO <sub>2</sub>	116
Mo <sub>2</sub> C	381	Ta <sub>2</sub> H	164
MoS <sub>2</sub>	214–215, 311, 342	Ta <sub>2</sub> O <sub>5</sub>	203
NH <sub>3</sub>	16, 309, 360–361, 389, 396	Tb <sub>1–x</sub> Dy <sub>x</sub>	253–254, 282–283
NO	17, 309	TbFe <sub>2</sub>	264, 282–283
NaCl	21, 26, 34, 70, 292, 342, 397, 512	Th <sub>4</sub> H <sub>15</sub>	164–165
Nb <sub>3</sub> Al	223	TiB <sub>2</sub>	158
Nb <sub>3</sub> Ga	222–223	TiC	158
Nb <sub>3</sub> Ge	223, 249	TiN	157–158, 369–370, 390
NbMo	221	Ti <sub>2</sub> N	390
NbN	223	TiO <sub>2</sub>	70, 203, 205, 292, 295–296
Nb <sub>3</sub> Sn	3, 222–223, 236, 239, 241, 246	Ti <sub>2</sub> O <sub>3</sub>	378
NbTa	237–238	Ti <sub>x</sub> Si <sub>y</sub>	370
NbTi	222, 236, 239, 241	UPt <sub>3</sub>	234
NbZr	221	VC	380–381
NiAl	159–161	V <sub>3</sub> Ga	593
Ni <sub>3</sub> Al	383	V <sub>2</sub> O <sub>5</sub>	214–215
NiCr	158	V <sub>3</sub> Si	25, 34, 223
Ni <sub>50</sub> Fe <sub>50</sub>	278	WC	158, 381
NiMn	282	W <sub>2</sub> C	158, 381
Ni <sub>3</sub> Mo	381	WF <sub>6</sub>	370
NiO	89, 282	Y <sub>2</sub> O <sub>3</sub>	158, 216, 394, 396
Ni <sub>0.76</sub> P <sub>0.24</sub>	21		
Ni <sub>3</sub> Ti	159, 381, 383		
PH <sub>3</sub>	360		
P <sub>2</sub> O <sub>5</sub>	367		
PbBi	220		
PbIn	220		
PbO	17, 22		

ZnMn	79, 83–84
ZnO	116, 461
ZnS	21, 26, 117, 284, 295
ZnSe	70, 111–112, 284, 292
ZnTe	498
ZrC	158
Zr <sub>3</sub> N <sub>4</sub>	158
ZrO <sub>2</sub>	158, 216, 445
ZrZn <sub>2</sub>	630

### Ternary compounds and alloys

Al <sub>1-x</sub> B <sub>x</sub> As	147
Al <sub>62</sub> Cu <sub>26</sub> Fe <sub>12</sub>	387
Al <sub>6</sub> Fe <sub>1-x</sub> Mo <sub>x</sub>	387
Al <sub>6</sub> Mn <sub>1-x</sub> Fe <sub>x</sub>	387
B <sub>3</sub> N <sub>3</sub> H <sub>6</sub>	360
a-BNH	360
BaBiO <sub>3</sub>	223–224
BaCO <sub>3</sub>	394
BaFe <sub>12</sub> O <sub>19</sub>	264, 266, 271, 274–275
BaPbO <sub>3</sub>	223
BaTiO <sub>3</sub>	203–204
BeSiN <sub>2</sub>	396
CH <sub>2</sub> Cl <sub>2</sub>	402
(CH) <sub>3</sub> Ga	359
CH <sub>3</sub> SiH <sub>3</sub>	397
(CH <sub>3</sub> ) <sub>4</sub> Si	486
CaCO <sub>3</sub>	70, 496–497
Cd <sub>1-x</sub> Mn <sub>x</sub> Te	284
Cd <sub>2</sub> SnO <sub>4</sub>	116
CeCu <sub>2</sub> Si <sub>2</sub>	234
CuNiZn	91
CuSO <sub>4</sub>	155
a-DyFeCo	277
a-Fe <sub>80</sub> B <sub>11</sub> Si <sub>9</sub>	162, 278, 281
Fe(CN) <sub>6</sub>	75
FeCoV	280
Fe <sub>83</sub> P <sub>10</sub> C <sub>7</sub>	162
Fe <sub>85</sub> Si <sub>10</sub> Al <sub>5</sub> (Sendust)	264, 281
Ga <sub>1-x</sub> Al <sub>x</sub> As	129–130, 132, 343
Ga <sub>1-x</sub> Mn <sub>x</sub> As	284
a-GdTbFe	277–278
H <sub>3</sub> PO <sub>4</sub>	216
Hg <sub>1-x</sub> Mn <sub>x</sub> Te	284
InAs <sub>1-x</sub> Sb <sub>x</sub>	439
In <sub>x</sub> Ga <sub>1-x</sub> As	126
In <sub>x</sub> Sn <sub>y</sub> O <sub>2</sub> (ITO)	116, 331, 406
KOH	372
La <sub>2</sub> CuO <sub>4</sub>	116, 224
LaMo <sub>6</sub> Se <sub>8</sub>	223
LiAsF <sub>6</sub>	214–215
LiNbO <sub>3</sub>	332
LiTaO <sub>3</sub>	332
LiTi <sub>2</sub> O <sub>4</sub>	223
Mg <sub>3</sub> (OH) <sub>6</sub> (brucite)	177

Mg <sub>2</sub> SiO <sub>4</sub>	13
Mg <sub>3</sub> TeO <sub>6</sub>	498
MnFe <sub>2</sub> O <sub>4</sub>	281
Mn <sub>75</sub> P <sub>15</sub> C <sub>10</sub>	162
NH <sub>4</sub> Cl	396
Na <sub>3</sub> AlF <sub>6</sub>	70
Nd <sub>2</sub> Fe <sub>12</sub> B	264, 266, 270–271
Ni <sub>77</sub> Fe <sub>18</sub> Cu <sub>5</sub> (Mumetal)	264, 278–279
Ni <sub>79</sub> Fe <sub>16</sub> Mo <sub>5</sub> (Supermalloy)	264, 278–279
PbTiO <sub>3</sub>	443
Pd <sub>68</sub> Co <sub>12</sub> Si <sub>20</sub>	162
Pd <sub>78</sub> Si <sub>16</sub> Cu <sub>6</sub>	162
RM <sub>4</sub> Sb <sub>14</sub> (R = La, Ce, etc., M = Fe, Os, Ru)	145
a-SiCH	360
SiCl <sub>2</sub> H <sub>2</sub>	396
SiHCl <sub>3</sub>	353
a-SiNH	360–361
Si(NH) <sub>2</sub>	360, 396
SiO <sub>2-x</sub> H <sub>2x</sub>	360
Si <sub>2</sub> ON <sub>2</sub>	271
Sm <sub>2</sub> Fe <sub>17</sub> N <sub>3</sub>	268
SrFe <sub>12</sub> O <sub>19</sub>	271
SrTiO <sub>3</sub>	70, 204, 292, 394, 443
Tb <sub>2</sub> Al <sub>5</sub> O <sub>12</sub>	292
Tb <sub>0.3</sub> Dy <sub>0.7</sub> Fe <sub>2</sub>	264, 282–284
a-TbFeCo	277–278
Ti <sub>2</sub> AlN	390
URu <sub>2</sub> Si <sub>2</sub>	234
Y <sub>3</sub> Al <sub>2</sub> (AlO <sub>4</sub> ) <sub>3</sub> (YAG)	175, 297
Y <sub>3</sub> Fe <sub>5</sub> O <sub>12</sub>	264
YRh <sub>4</sub> B <sub>4</sub>	223
Y <sub>2</sub> SiO <sub>5</sub>	696
Zn <sub>25.75</sub> Al <sub>4.01</sub> Cu <sub>70.24</sub>	160
ZnFe <sub>2</sub> O <sub>4</sub>	281
Zn <sub>1-x</sub> Mn <sub>x</sub> S	117, 284
ZnSO <sub>4</sub>	155

### Quaternary compounds and alloys

Al <sub>2</sub> Si <sub>2</sub> O <sub>5</sub> (OH) <sub>4</sub> (kaolinite)	178
Ba <sub>0.6</sub> K <sub>0.4</sub> BiO <sub>3</sub>	224, 249
BaPb <sub>1-x</sub> Bi <sub>x</sub> O <sub>3</sub>	223
Be <sub>3</sub> Al <sub>2</sub> Si <sub>6</sub> O <sub>6</sub> (beryl)	175
Cu <sub>2</sub> CO <sub>3</sub> (OH) <sub>2</sub>	70
CuIn <sub>1-x</sub> Ga <sub>x</sub> Se	140
DyBa <sub>2</sub> Cu <sub>3</sub> O <sub>7</sub>	231
a-FeBSiC (metglas)	264, 284
FeWMnC (tungsten steel)	266–267
KH <sub>2</sub> PO <sub>4</sub> (KDP)	70, 292
La <sub>1-x</sub> Ca <sub>x</sub> MnO <sub>3</sub>	256–257
La <sub>2-x</sub> Sr <sub>x</sub> CuO <sub>4</sub>	116, 224, 229–230, 351, 459
Mn <sub>1-x</sub> Zn <sub>x</sub> Fe <sub>2</sub> O <sub>4</sub>	264, 281
Nd <sub>2-x</sub> Ce <sub>x</sub> CuO <sub>4</sub>	224
Pb(Mg <sub>1/3</sub> Nb <sub>2/3</sub> )O <sub>3</sub>	204

$\text{Pb}_x\text{Zr}_y\text{Ti}_z\text{O}_3$ (PZT)	209–210
$\text{Pb}(\text{Zn}_{1/3}\text{Nb}_{2/3})\text{O}_3$ (PZN)	204
$\text{RNi}_2\text{B}_2\text{C}$ (R = Y, Dy, Ho, Er, Tm, Lu)	223
$\text{Sm}_2\text{Fe}_{15}\text{Ga}_2\text{C}_3$	269
$\text{YBa}_2\text{Cu}_3\text{O}_{7-x}$	34, 224–228, 230, 232, 235–237, 240–241, 246–248, 394, 470

### Larger compounds, alloys, and some minerals

$\text{Bi}_v\text{Sr}_w\text{Ca}_x\text{Cu}_y\text{O}_z$	236, 240–241
Cordeirite	205
$\text{FeCoCrWC}$ (cobalt steel)	266–267
$\text{FeNiAlCoCu}$ (Alnico)	264, 266–267
$\text{Hg}_v\text{Ba}_w\text{Ca}_x\text{Cu}_y\text{O}_z$	227, 233, 249
Mica	177–178, 203, 342
Mullite	205
$\text{Ni}_{36}\text{Fe}_{32}\text{Cr}_{14}\text{P}_{12}\text{B}_6$	162
$\text{Pb}_{1-x}\text{La}_x(\text{Zr}_y\text{Ti}_{1-y})_{1-x/4}\text{O}_3$ (PLZT)	204
$\text{Sm}(\text{CoFeCuZr})_7$	266, 269
Talc	99
Zeolites:	
Linde A	398
ZSM5	397, 492

### Polymers

Goretex	195
Polyacetylene (PA)	154, 196–200, 404

Polyaniline	116, 196, 404
Bisphenol-A polycarbonate (PC)	70, 402–403, 476
Polyethylene (PE)	289
Polyimide	205–206, 409
Polymethacrylonitrile (PMAN)	195
Polymethylmethacrylate (PMMA)	70, 366, 409
Polypropylene (PP)	196
Polypyrrole	116, 196, 404
Polystyrene (PS)	70, 194, 403
Polytetrafluorethylene (PTFE, Teflon)	206, 476
Poly(2,5-thiophene)	196, 404
Polyurethane (PUR)	194
Polyvinylene	289
Poly(N-vinylcarbazole) (PVK)	202, 406
Rubber	102

### Some organic molecules

$\text{Ba}(\text{THD})_2$	395
Bisphenol-A	402
$\text{Cu}(\text{THD})_2$	395
DNA	17
Tetraethylorthosilicate (TEOS)	360, 369
Tetramethylammonium (TMA) bromide	398
Tetrapropylammonium (TPA) bromide	398
6FDA/TFDB	201
3-phenyl-5-isoxazolone	201
poly(2-methoxy-5-(2'-ethyl-hexyloxy)- 1,4-phenylene vinylene) (MEH-PPP)	404
Tetrathiafulvalene-tetracyanoquino- dimethane (TTF-TCNQ)	196
$\text{Y}(\text{THD})_3$	395