Key of Symbols

** influenced by composition ** Cr-plated rod or strip ***All metals alumina coated*
***C** = carbon **Gr** = graphite **Q** = quartz **Incl** = Inconel **VC** = vitreous carbon **SS** = stainless steel*
***Ex** = excellent **G** = good **F** = fair **P** = poor **S** = sublimes **D** = decomposes*
***RF** = RF sputtering is effective **RF-R** = reactive RF sputter is effective*
***DC** = DC sputtering is effective **DC-R** = reactive DC sputtering is effective*

Material	Symbol	MP (°C)	S/D	g/cm^3	Temp.(°C) for Given Vap. Press. (Torr)			Evaporation Techniques					Sputter	Comments
					10^{-8}	10^{-6}	10^{-4}	E-Beam	Thermal Sources					
									Boat	Coil	Basket	Crucible		
Aluminum	Al	660		2.70	677	821	1010	Ex	TiB_2,W	W	W	TiB_2-BN, ZrB_2, BN	RF, DC	Alloys and wets. Stranded W is best.
Aluminum Antimonide	AlSb	1080		4.3	-	-	-	-	-	-	-	-	RF	-
Aluminum Arsenide	AlAs	1600		3.7	-	-	~ 1300	-	-	-	-	-	RF	-
Aluminum Bromide	$AlBr_3$	97		2.64	-	-	~ 50	-	Mo	-	-	Gr	RF	-
Aluminum Carbide	Al_4C_3	~1400	D	2.36	-	-	~ 800	F	-	-	-	-	RF	n = 2.7
Aluminum, 2% Copper	Al2%Cu	640		2.82	-	-	-	-	-	-	-	-	RF, DC	Wire feed and flash. Difficult from dual sources.
Aluminum Fluoride	AlF_3	1291	S	2.88	410	490	700	P	Mo, W, Ta	-	-	Gr	RF	-
Aluminum Nitride	AlN	>2200	S	3.26	-	-	~1750	F	-	-	-	-	RF, RF-R	Decomposes. Reactive evap in 10^{-3} T N2 with glow discharge.

Aluminum Oxide	Al_2O_3	2072		3.97	-	-	1550	Ex	W	-	W	-	RF-R	Sapphire excellent in E-beam; forms smooth, hard films. n = 1.66
Aluminum Phosphide	AlP	2000		2.42	-	-	-	-	-	-	-	-	RF	-
Aluminum, 2% Silicon	Al2%Si	640		2.69	-	-	1010	-	-	-	-	TiB_2-BN	RF, DC	Wire feed and flash. Difficult from dual sources.
Antimony	Sb	630	S	6.68	279	345	425	P	Mo,*** Ta***	Mo, Ta	Mo, Ta	BN, C, Al_2O_3	RF, DC	Toxic. Evaporates well.
Antimony Oxide	Sb_2O_3	656	S	5.2	-	-	~300	G	Pt	-	Pt	BN, Al_2O_3	RF-R	Toxic. Decomposes on W. n = 2.09, 2.18, 2.35
Antimony Selenide	Sb_2Se_3	611		-	-	-	-	-	Ta	-	-	C	RF	Stoichiometry variable.
Antimony Sulfide	Sb_2S_3	550		4.64	-	-	~200	G	Mo, Ta	-	Mo, Ta	Al_2O_3	-	No decomposition. n=3.19, 4.06, 4.3
Antimony Telluride	Sb_2Te_3	629		6.50	-	-	600	-	-	-	-	C	RF	Decomposes over 750°C.
Arsenic	As	817	S	5.73	107	150	210	P	C	-	-	Al_2O_3, BeO, VC	-	Toxic. Sublimes rapidly at low temperature.
Arsenic Oxide	As_2O_3	312		3.74	-	-	-	-	-	-	-	-	-	-
Arsenic Selenide	As_2Se_3	~360		4.75	-	-	-	-	-	-	-	Al_2O_3, Q	RF	-
Arsenic Sulfide	As_2S_3	300		3.43	-	-	~400	F	Mo	-	-	Al_2O_3, Q	RF	n = 2.4, 2.81, 3.02
Arsenic Telluride	As_2Te_3	362		-	-	-	-	-	Flash	-	-	-	-	*JVST*. 1973;10:748.
Barium	Ba	725		3.51	545	627	735	F	W, Ta, Mo	W	W	Metals	RF	Wets without alloying reacts with ceramics.
Barium Chloride	$BaCl_2$	963		3.92	-	-	~650	-	Ta, Mo	-	-	-	RF	Preheat gently to outgas. n = 1.73
Barium Fluoride	BaF_2	1355	S	4.89	-	-	~700	G	Mo	-	-	-	RF	n = 1.47
Barium Oxide	BaO	1918		5.72	-	-	~1300	P	Pt	-	Pt	Al_2O_3	RF, RF-R	Decomposes slightly. n = 1.98
Barium Sulfide	BaS	1200		4.25	-	-	1100	-	Mo	-	-	-	RF	n = 2.16

Barium Titanate	$BaTiO_3$	-	D	6.02	-	-	-	-	-	-	-	-	RF	Gives Ba. Co-evap. from 2 sources or sputter. n = 2.40
Beryllium	Be	1278		1.85	710	878	1000	Ex	W, Ta	W	W	BeO, C, VC	RF, DC	Wets W/Mo/Ta. Powder and oxides toxic. Evaporates easily.
Beryllium Carbide	Be_2C	>2100	D	1.90	-	-	-	-	-	-	-	-	-	-
Beryllium Chloride	$BeCl_2$	405		1.90	-	-	~150	-	-	-	-	-	RF	-
Beryllium Fluoride	BeF_2	800	S	1.99	-	-	~200	G	-	-	-	-	-	Toxic. n = <1.33
Beryllium Oxide	BeO	2530		3.01	-	-	1900	G	-	-	W	-	RF, RF-R	Toxic. No decomposition from E-beam guns. n=1.72
Bismuth	Bi	271		9.80	330	410	520	Ex	W, Mo, Ta	W	W	Al_2O_3, VC	DC, RF	Toxic vapor. Resistivity high. No shorting of baskets.
Bismuth Fluoride	BiF_3	727	S	5.32	-	-	~300	-	-	-	-	Gr	RF	n = 1.74
Bismuth Oxide	Bi_2O_3	860		8.55	-	-	~1400	P	Pt	-	Pt	-	RF, RF-R	Toxic vapor. n = 1.91
Bismuth Selenide	Bi_2Se_3	710	D	6.82	-	-	~650	G	-	-	-	Gr, Q	RF	Co-evaporate from two sources or sputter.
Bismuth Sulfide	Bi_2S_3	685	D	7.39	-	-	-	-	-	-	-	-	RF	n = 1.34, 1.46
Bismuth Telluride	Bi_2Te_3	573		7.7	-	-	~600	-	W, Mo	-	-	Gr, Q	RF	Co-evaporate from two sources or sputter.
Bismuth Titanate	$Bi_2Ti_2O_7$	-	D	-	-	-	-	-	-	-	-	-	RF	Sputter or co-evaporate from two sources in 10^{-2} Torr oxygen.
Boron	B	2300		2.34	1278	1548	1797	Ex	C	-	-	C, VC	RF	Explodes with rapid cooling. Forms carbide with container.
Boron Carbide	B_4C	2350		2.52	2500	2580	2650	Ex	-	-	-	-	RF	Similar to chromium.
Boron Nitride	BN	~3000	S	2.25	-	-	~1600	P	-	-	-	-	RF, RF-R	Decomposes under sputtering; reactive preferred.
Boron Oxide	B_2O_3	~450		1.81	-	-	~1400	G	Pt, Mo	-	-	-	-	n = 1.48
Boron Sulfide	B_2S_3	310		1.55	-	-	800	-	-	-	-	Gr	RF	-

Cadmium	Cd	321		8.64	64	120	180	P	W, Mo, Ta	-	W, Mo, Ta	Al_2O_3, Q	DC, RF	Bad for vacuum systems. Low sticking coefficient.
Cadmium Antimonide	Cd_3Sb_2	456		6.92	-	-	-	-	-	-	-	-	-	-
Cadmium Arsenide	Cd_3As_2	721		6.21	-	-	-	-	-	-	-	Q	RF	-
Cadmium Bromide	$CdBr_2$	567		5.19	-	-	~300	-	-	-	-	-	-	-
Cadmium Chloride	$CdCl_2$	568		4.05	-	-	~400	-	-	-	-	-	-	-
Cadmium Fluoride	CdF_2	1100		6.64	-	-	~500	-	-	-	-	-	RF	n = 1.56
Cadmium Iodide	CdI_2	387		5.67	-	-	~250	-	-	-	-	-	-	-
Cadmium Oxide	CdO	>1500	D	6.95	-	-	~530	-	-	-	-	-	RF-R	Disproportionates. n = 2.49
Cadmium Selenide	CdSe	>1350	S	5.81	-	-	540	G	Mo, Ta	-	-	Al_2O_3, Q	RF	Evaporates easily. n = 2.4
Cadmium Sulfide	CdS	1750	S	4.82	-	-	550	F	W, Mo, Ta	-	W	Al_2O_3, Q	RF	Sticking coefficient affected by substrate temperature. Stoichiometry variable. n = 2.51, 2.53
Cadmium Telluride	CdTe	1121		5.85	-	-	450	-	W, Mo, Ta	W	W, Ta, Mo	-	RF	Stoichiometry depends on substrate temperature. n~ 2.6
Calcium	Ca	839	S	1.54	272	357	459	P	W	W	W	Al_2O_3, Q	-	Corrodes in air.
Calcium Fluoride	CaF_2	1423		3.18	-	-	~1100	-	W, Mo, Ta	W, Mo, Ta	W, Mo, Ta	Q	RF	Rate control important. Preheat gently to outgas. n = 1.43
Calcium Oxide	CaO	2614		~3.3	-	-	~1700	-	W, Mo	-	-	ZrO_2	RF, RF-R	Forms volatile oxides with tungsten and molybdenum. n = 1.84
Calcium Silicate	$CaSiO_3$	1540		2.91	-	-	-	G	-	-	-	Q	RF	n = 1.61, 1.66
Calcium Sulfide	CaS	-	D	2.5	-	-	1100	-	Mo	-	-	-	RF	Decomposes. n = 2.14

Calcium Titanate	$CaTiO_3$	1975		4.10	1490	1600	1690	P	-	-	-	-	RF	Disproportionates except in sputtering. n = 2.34
Calcium Tungstate	$CaWO_4$	-		6.06	-	-	-	G	W	-	-	-	RF	n = 1.92
Carbon	C	~3652	S	1.8-2.1	1657	1867	2137	Ex	-	-	-	-	RF	E-beam preferred. Arc evaporation. Poor film adhesion.
Cerium	Ce	798		~6.70	970	1150	1380	G	W, Ta	W	W, Ta	Al_2O_3, BeO, VC	DC, RF	-
Cerium Fluoride	CeF_3	1460		6.16	-	-	~900	G	W, Mo, Ta	-	Mo, Ta	-	RF	Preheat gently to outgas. n ~ 1.7
Cerium (III) Oxide	Ce_2O_3	1692		6.86	-	-	-	F	W	-	-	-	-	Alloys with source. Use 0.015"-0.020" tungsten boat. n = 1.95
Cerium (IV) Oxide	CeO_2	~2600		7.13	1890	2000	2310	G	W	-	-	-	RF, RF-R	Very little decomposition.
Cesium	Cs	28		1.88	-16	22	80	-	SS	-	-	Q	-	-
Cesium Bromide	CsBr	636		3.04	-	-	~400	-	W	-	-	-	RF	n = 1.70
Cesium Chloride	CsCl	645		3.99	-	-	~500	-	W	-	-	-	RF	n = 1.64
Cesium Fluoride	CsF	682		4.12	-	-	~500	-	W	-	-	-	RF	n = 1.48
Cesium Hydroxide	CsOH	272		3.68	-	-	550	-	Pt	-	-	-	-	-
Cesium Iodide	CsI	626		4.51	-	-	~500	-	W	-	-	Pt, Q	RF	n = 1.79
Chiolote	$Na_5Al_3F_{14}$	-		2.9	-	-	~800	-	Mo, W	-	-	-	RF	n = 1.33
Chromium	Cr	1857	S	7.20	837	977	1157	G	**	W	W	VC	RF, DC	Films very adherent. High rates possible.
Chromium Boride	CrB	2760(?)		6.17	-	-	-	-	-	-	-	-	RF, DC	-
Chromium Bromide	$CrBr_2$	842		4.36	-	-	550	-	Incl	-	-	-	RF	-
Chromium Carbide	Cr_3C_2	1980		6.68	-	-	~2000	F	W	-	-	-	RF, DC	-

Chromium Chloride	$CrCl_2$	824		2.88	-	-	550	-	Fe, Incl	-	-	-	RF	-
Chromium Oxide	Cr_2O_3	2266		5.21	-	-	~2000	G	W, Mo	-	W	-	RF, RF-R	Disproportionates to lower oxides; reoxidizes at 600°C in air.n = 2.55
Chromium Silicide	Cr_3Si_2	-		5.5	-	-	-	-	-	-	-	-	RF, DC	-
Chromium-Silicon Monoxide	Cr-SiO	-	S	*	*	*	*	G	W	-	W	-	DC, RF	Flash.
Cobalt	Co	1495		8.9	850	990	1200	Ex	W, Nb	-	W	Al_2O_3, BeO	DC, RF	Alloys with refractory metals.
Cobalt Bromide	$CoBr_2$	678	D	4.91	-	-	400	-	Incl	-	-	-	RF	-
Cobalt Chloride	$CoCl_2$	724	D	3.36	-	-	472	-	Incl	-	-	-	RF	-
Cobalt Oxide	CoO	1795		6.45	-	-	-	-	-	-	-	-	DC-R, RF-R	Sputter preferred.
Copper	Cu	1083		8.92	727	857	1017	Ex	Mo	W	W	Al_2O_3, Mo, Ta	DC, RF	Adhesion poor. Use interlayer (Cr). Evaporates using any source material.
Copper Chloride	CuCl	430		4.14	-	-	~600	-	-	-	-	-	RF	n = 1.93
Copper Oxide	Cu_2O	1235	S	6.0	-	-	~600	G	Ta	-	-	Al_2O_3	DC-R, RF-R	n = 2.71
Copper Sulfide	Cu_2S	1100		5.6	-	-	-	-	-	-	-	-	-	-
Cryolite	Na_3AlF_6	1000		2.9	1020	1260	1480	Ex	W, Mo, Ta	-	W, Mo, Ta	VC	RF	Large chunks reduce spitting. Little decomposition.
Dysprosium	Dy	1412		8.55	625	750	900	G	Ta	-	-	-	RF, DC	-
Dysprosium Fluoride	DyF_3	1360	S	-	-	-	~800	G	Ta	-	-	-	RF	-
Dysprosium Oxide	Dy_2O_3	2340		7.81	-	-	~1400	-	Ir	-	-	-	RF, RF-R	Loses oxygen.
Erbium	Er	1529	S	9.07	650	775	930	G	W, Ta	-	-	-	DC, RF	-
Erbium Fluoride	ErF_3	1350		-	-	-	~750	-	Mo	-	-	-	RF	*JVST*. 1985;A3(6):2320.

Erbium Oxide	Er_2O_3	Infus.		8.64	-	-	~1600	-	Ir	-	-	-	RF, RF-R	Loses oxygen.
Europium	Eu	822	S	5.24	280	360	480	F	W, Ta	-	-	Al_2O_3	RF, DC	Low tantalum solubility.
Europium Fluoride	EuF_2	1380		6.50	-	-	~950	-	Mo	-	-	-	RF	-
Europium Oxide	Eu_2O_3	-		7.42	-	-	~1600	G	Ir, Ta, W	-	-	ThO_2	RF, RF-R	Loses oxygen. Films clear and hard.
Europium Sulfide	EuS	-		5.75	-	-	-	G	-	-	-	-	RF	-

Material	Symbol	MP (°C)	S/D	g/cm³	Temp.(°C) for Given Vap. Press. (Torr)			Evaporation Techniques					Sputter	Comments
									Thermal Sources					
					10^{-8}	10^{-6}	10^{-4}	E-Beam	Boat	Coil	Basket	Crucible		
Gadolinium	Gd	1313		7.90	760	900	1175	Ex	Ta	-	-	Al_2O_3	RF, DC	High tantalum solubility.
Gadolinium Carbide	GdC_2	-		-	-	-	1500	-	-	-	-	C	RF	Decomposes under sputtering.
Gadolinium Oxide	Gd_2O_3	2330		7.41	-	-	-	F	Ir	-	-	-	RF, RF-R	Loses oxygen.
Gallium	Ga	30		5.90	619	742	907	G	-	-	-	Al_2O_3, BeO, Q	-	Alloys with refractory metals. Use E-beam gun.
Gallium Antimonide	GaSb	710		5.6	-	-	-	F	W, Ta	-	-	-	RF	Flash evaporate.
Gallium Arsenide	GaAs	1238		5.3	-	-	-	G	W, Ta	-	-	C	RF	Flash evaporate.
Gallium Nitride	GaN	800	S	6.1	-	-	~200	-	-	-	-	Al_2O_3	RF, RF-R	Evaporates gallium in 10-3 Torr nitrogen.
Gallium Oxide	Ga_2O_3	1900		6.44	-	-	-	-	Pr, W	-	-	-	RF	Loses oxygen. n = 1.92

Gallium Phosphide	GaP	1540		4.1	-	770	920	-	W, Ta	-	W	Q	RF	Does not decompose. Rate control important.
Germanium	Ge	937		5.35	812	957	1167	Ex	W, C, Ta	-	-	Q, Al_2O_3	DC, RF	Excellent films from E-beam guns.
Germanium Nitride	Ge_3N_2	450	S	5.2	-	-	~650	-	-	-	-	-	RF-R	Sputtering preferred.
Germanium (II) Oxide	GeO	710	S	-	-	-	500	-	-	-	-	Q	RF	n = 1.61

Material	Symbol	MP (°C)	S/D	g/cm^3	Temp.(°C) for Given Vap. Press. (Torr)			Evaporation Techniques					Sputter	Comments
					10^{-8}	10^{-6}	10^{-4}	E-Beam	Thermal Sources					
									Boat	Coil	Basket	Crucible		
Germanium (III) Oxide	GeO_2	1086		6.24	-	-	~625	G	Ta, Mo	-	W, Mo	Q, Al_2O_3	RF-R	Similar to SiO; film predominantly GeO.
Germanium Telluride	GeTe	725		6.20	-	-	381	-	W, Mo	-	W	Q, Al_2O_3	RF	-
Glass, Schott 8329	-	-		2.20	-	-	-	Ex	-	-	-	-	RF	Evaporable alkali glass. Melt in air before evaporating.
Gold	Au	1064		19.32	807	947	1132	Ex	W	W	W*** Mo***	Al_2O_3, BN, VC	W	DC, RF, Films soft, not very adherent.
Hafnium	Hf	2227		13.31	2160	2250	3090	G	-	-	-	-	DC, RF	-
Hafnium Boride	HfB_2	3250		10.5	-	-	-	-	-	-	-	-	DC, RF	-
Hafnium Carbide	HfC	~3890	S	12.20	-	-	~2600	-	-	-	-	-	DC, RF	-
Hafnium Nitride	HfN	3305		-	-	-	-	-	-	-	-	-	RF, RF-R	-
Hafnium Oxide	HfO_2	2758		9.68	-	-	~2500	F	W	-	-	-	DC, RF, RF-R	Film HfO.
Hafnium Silicide	$HfSi_2$	1750		7.2	-	-	-	-	-	-	-	-	RF	-

Material	Symbol	MP (°C)	S/D	g/cm^3	Temp.(°C) for Given Vap. Press. (Torr)			Evaporation Techniques					Sputter	Comments
									Thermal Sources					
					10^{-8}	10^{-6}	10^{-4}	E-Beam	Boat	Coil	Basket	Crucible		
Holmium	Ho	1474		8.80	650	770	950	G	W, Ta	W	W	-	-	-
Holmium Fluoride	HoF_3	1143		-	-	-	~800	-	-	-	-	Q	DC, RF	-
Holmium Oxide	Ho_2O_3	2370		8.41	-	-	-	-	Ir	-	-	-	RF, RF-R	Loses oxygen.
Inconel	Ni/Cr/Fe	1425		8.5	-	-	-	G	W	W	W	-	DC, RF	Use fine wire wrapped on tungsten. Low rate required for smooth films.
Indium	In	157		7.30	487	597	742	Ex	W, Mo	-	W	Gr, Al_2O_3	DC, RF	Wets tungsten and copper. Use molybdenum liner.
Indium Antimonide	InSb	535		5.8	-	-	-	-	W	-	-	-	RF	Decomposes; sputter preferred; or co-evaporate
Indium Arsenide	InAs	943		5.7	780	870	970	-	W	-	-	-	RF	-
Indium Nitride	InN	1200		7.0	-	-	-	-	-	-	-	-	-	-
Indium (I) Oxide	In_2O	~600	S	6.99	-	-	650	-	-	-	-	-	RF	Decomposes under sputtering.
Indium (III) Oxide	In_2O_3	850		7.18	-	-	~1200	G	W, Pt	-	-	Al_2O_3	-	-
Indium Phosphide	InP	1070		4.8	-	630	730	-	W, Ta	-	W, Ta	Gr	RF	Deposits are phosphorus rich.
Indium Selenide	In_2Se_3	890		5.67	-	-	-	-	-	-	-	-	RF	Sputtering preferred; or co-evaporate from two sources; flash.
Indium (I) Sulfide	In_2S	653		5.87	-	-	650	-	-	-	-	Gr	RF	-
Indium (II) Sulfide	InS	692	S	5.18	-	-	650	-	-	-	-	Gr	RF	-
Indium (III) Sulfide	In_2S_3	1050	S	4.90	-	-	850	-	-	-	-	Gr	RF	Film In_2S.
Indium (II)	InTe	696		6.29	-	-	-	-	-	-	-	-	-	-

Material	Symbol	MP (°C)	S/D	g/cm^3	Temp.(°C) for Given Vap. Press. (Torr)			Evaporation Techniques					Sputter	Comments
									Thermal Sources					
					10^{-8}	10^{-6}	10^{-4}	E-Beam	Boat	Coil	Basket	Crucible		
Telluride														
Indium (III) Telluride	In_2Te_3	667		5.78	-	-	-	-	-	-	-	-	RF	Sputtering preferred; or co-evaporate from two sources; flash.
Indium Tin Oxide	In_2O_3-SnO_2	1800	S	-	-	-	-	-	-	-	-	-	-	-
Iridium	Ir	2410		22.42	1850	2080	2380	F	-	-	-	ThO_2	DC, RF	-
Iron	Fe	1535		7.86	858	998	1180	Ex	W	W	W	Al_2O_3, BeO	DC, RF	Attacks tungsten. Films hard, smooth. Preheat gently to outgas.
Iron Bromide	$FeBr_2$	684	D	4.64	-	-	561	-	-	-	-	Fe	RF	-
Iron Chloride	$FeCl_2$	670	S	3.16	-	-	300	-	-	-	-	Fe	RF	n = 1.57
Iron Iodide	FeI_2	-		5.32	-	-	400	-	-	-	-	Fe	RF	-
Iron (II) Oxide	FeO	1369		5.7	-	-	-	P	-	-	-	-	RF, RF-R	Decomposes; sputtering preferred. n=2.32
Iron (III) Oxide	Fe_2O_3	1565		5.24	-	-	-	G	W	-	W	-	-	Disproportionates to Fe_3O_4 at 1530°C. n = 3.01
Iron Sulfide	FeS	1193	D	4.74	-	-	-	-	-	-	-	Al_2O_3	RF	Decomposes.
Kanthal	FeCrAl	-		7.1	-	-	-	-	W	W	W	-	DC, RF	-
Lanthanum	La	921		6.15	990	1212	1388	Ex	W, Ta	-	-	Al_2O_3	RF	Films will burn in air if scraped.
Lanthanum Boride	LaB_6	2210	D	2.61	-	-	-	G	-	-	-	-	RF	-
Lanthanum Bromide	$LaBr_3$	783		5.06	-	-	-	-	-	-	Ta	-	RF	n=1.94. Hygroscopic.
Lanthanum Fluoride	LaF_3	1490	S	~6.0	-	-	900	G	Ta, Mo	-	Ta	-	RF	No decomposition. n ~1.6

Lanthanum Oxide	La_2O_3	2307		6.51	-	-	1400	G	W, Ta	-	-	-	RF	Loses oxygen. n~1.73

Material	Symbol	MP (°C)	S/D	g/cm³	Temp.(°C) for Given Vap. Press. (Torr)			Evaporation Techniques					Sputter	Comments
									Thermal Sources					
					10^{-8}	10^{-6}	10^{-4}	E-Beam	Boat	Coil	Basket	Crucible		
Lead	Pb	328		11.34	342	427	497	Ex	W, Mo	W	W, Ta	Al_2O_3, Q	DC, RF	Toxic.
Lead Bromide	$PbBr_2$	373		6.66	-	-	~300	-	-	-	-	-	-	-
Lead Chloride	$PbCl_2$	501		5.85	-	-	~325	-	Pt	-	-	Al_2O_3	RF	Little decomposition.
Lead Fluoride	PbF_2	855	S	8.24	-	-	~400	-	W, Pt, Mo	-	-	BeO	RF	n = 1.75
Lead Iodide	PbI_2	402		6.16	-	-	~500	-	Pt	-	-	Q	-	-
Lead Oxide	PbO	886		9.53	-	-	~550	-	Pt	-	-	Q, Al_2O_3	RF-R	No decomposition. n ~2.6
Lead Selenide	PbSe	1065	S	8.10	-	-	~500	-	W, Mo	-	W	Gr, Al_2O_3	RF	-
Lead Stannate	$PbSnO_3$	1115		8.1	670	780	905	P	Pt	-	Pt	Al_2O_3	RF	Disproportionates.
Lead Sulfide	PbS	1114	S	7.5	-	-	500	-	W	-	W, Mo	Q, Al_2O_3	RF	Little decomposition. n = 3.92
Lead Telluride	PbTe	917		8.16	780	910	1050	-	Mo, Pt, Ta	-	-	Al_2O_3, Gr	RF	Vapors toxic. Deposits aretellurium rich. Sputtering preferred or co-evaporate from two sources.
Lead Titanate	$PbTiO_3$	-		7.52	-	-	-	-	Ta	-	-	-	RF	-
Lithium	Li	181		0.53	227	307	407	G	Ta, SS	-	-	Al_2O_3, BeO	-	Metal reacts quickly in air.
Lithium Bromide	LiBr	550		3.46	-	-	~500	-	Ni	-	-	-	RF	n = 1.78
Lithium Chloride	LiCl	605		2.07	-	-	400	-	Ni	-	-	-	RF	Preheat gently to outgas. n = 1.66

Lithium Fluoride	LiF	845		2.64	875	1020	1180	G	Ni, Ta, Mo, W	-	-	Al_2O_3	RF	Rate control important for optical films. Preheat gently to outgas. n = 1.39

Material	Symbol	MP (°C)	S/D	g/cm^3	Temp.(°C) for Given Vap. Press. (Torr)			Evaporation Techniques					Sputter	Comments
									Thermal Sources					
					10^{-8}	10^{-6}	10^{-4}	E-Beam	Boat	Coil	Basket	Crucible		
Lithium Iodide	LiI	449		4.08	-	-	400	-	Mo, W	-	-	-	RF	n = 1.96
Lithium Oxide	Li_2O	>1700		2.01	-	-	850	-	Pt, Ir	-	-	-	RF	n = 1.64
Lutetium	Lu	1663		9.84	-	-	1300	Ex	Ta	-	-	Al_2O_3	RF, DC	-
Lutetium Oxide	Lu_2O_3	-		9.42	-	-	1400	-	Ir	-	-	-	RF	Decomposes.

Magnesium	Mg	649	S	1.74	185	247	327	G	W, Mo, Ta, Cb	W	W	Al_2O_3, VC	DC, RF	Extremely high rates possible.
Magnesium Aluminate	$MgAl_2O_4$	2135		3.6	-	-	-	G	-	-	-	-	RF	Natural spinel. n = 1.72
Magnesium Bromide	$MgBr_2$	700		3.72	-	-	~450	-	Ni	-	-	-	RF	Decomposes.
Magnesium Chloride	$MgCl_2$	714		2.32	-	-	400	-	Ni	-	-	-	RF	Decomposes. n = 1.67
Magnesium Fluoride	MgF_2	1261		2.9-3.2	-	-	1000	Ex	Mo, Ta	-	-	Al_2O_3	RF	Rate control and substrate heat important for optical films. Reacts with tungsten. Excellent with molybdenum. n = 1.38
Magnesium Iodide	MgI_2	<637	D	4.43	-	-	200	-	Ir	-	-	-	RF	-

Magnesium Oxide	MgO	2852		3.58	-	-	1300	G	-	-	-	C, Al_2O_3	RF, RF-R	Evaporates in 10^{-3} Torr oxygen for stoichiometry. Tungsten gives volatile oxides. n~1.7
Manganese	Mn	1244	S	7.20	507	572	647	G	W, Ta, Mo	W	W	Al_2O_3, BeO	DC, RF	-
Manganese Bromide	$MnBr_2$	-	D	4.39	-	-	500	-	Incl	-	-	-	RF	-
Manganese Chloride	$MnCl_2$	650		2.98	-	-	450	-	Incl	-	-	-	RF	-
Manganese (III) Oxide	Mn_2O_3	1080		4.50	-	-	-	-	-	-	-	-	-	-
Manganese (IV) Oxide	MnO_2	535		5.03	-	-	-	P	W	-	W	-	RF-R	Loses oxygen at 535°C.
Manganese Sulfide	MnS	-	D	3.99	-	-	1300	-	Mo	-	-	-	RF	Decomposes. n = 2.70
Mercury	Hg	-39		13.55	-68	-42	-6	-	-	-	-	-	-	-
Mercury Sulfide	HgS	584	S	8.10	-	-	250	-	-	-	-	Al_2O_3	RF	Decomposes. n = 2.85, 3.20
Molybdenum	Mo	2610		10.2	1592	1822	2117	Ex	-	-	-	-	DC, RF	Films smooth, hard. Careful degas required.
Molybdenum Boride	MoB_2	2100		7.12	-	-	-	P	-	-	-	-	RF, DC	-
Molybdenum Carbide	Mo_2C	2687		8.9	-	-	-	F	-	-	-	-	RF, DC	Evaporation of $Mo(CO)_6$ yields Mo_2C.
Molybdenum Disulfide	MoS_2	1185		4.80	-	-	~50	-	-	-	-	-	RF	-
Molybdenum Oxide	MoO_3	795	S	4.69	-	-	~900	-	Mo, Pt	-	Mo	Al_2O_3, BN	RF	Slight oxygen loss. n = 1.9
Molybdenum Silicide	$MoSi_2$	2050		6.31	-	-	-	-	W	-	-	-	RF	Decomposes.
Neodymium	Nd	1021		7.01	731	871	1062	Ex	Ta	-	-	Al_2O_3	DC, RF	Low tantalum solubility.
Neodymium Fluoride	NdF_3	1410		6.5	-	-	~900	G	Mo, W	-	Mo, Ta	Al_2O_3	RF	Very little decomposition. n = 1.6

Neodymium Oxide	Nd_2O_3	~1900		7.24	-	-	~1400	G	Ta, W	-	-	ThO_2	RF, RF-R	Loses oxygen, films clear. E-beam preferred. n = 1.79
Nichrome IV	Ni/Cr	1395		8.50	847	987	1217	Ex	***	W	W, Ta	Al_2O_3, VC, BeO	DC, RF	Alloys with refractory metals.
Nickel	Ni	1455		8.90	927	1072	1262	Ex	W	W	W	Al_2O_3, BeO, VC	DC, RF	Alloys with refractory metals. Forms smooth adherent films.
Nickel Bromide	$NiBr_2$	963	S	5.10	-	-	362	-	Incl	-	-	-	RF	-
Nickel Chloride	$NiCl_2$	1001	S	3.55	-	-	444	-	Incl	-	-	-	RF	-
Nickel Oxide	NiO	1984		6.67	-	-	~1470	-	-	-	-	Al_2O_3	RF-R	Dissociates on heating. n = 2.18
Niobium	Nb	2468		8.57	1728	1977	2287	Ex	W	-	-	-	DC, RF	Attacks tungsten source. n = 1.80
Niobium Boride	NbB_2	2900(?)		6.97	-	-	-	-	-	-	-	-	RF, DC	-
Niobium Carbide	NbC	3500		7.6	-	-	-	F	-	-	-	-	RF, DC	-
Niobium Nitride	NbN	2573		8.4	-	-	-	-	-	-	-	-	RF, RF-R	Reactive. Evaporates niobium in 10^{-3} Torr nitrogen.
Niobium (II) Oxide	NbO	-		7.30	-	-	1100	-	Pt	-	-	-	RF	-
Niobium (III) Oxide	Nb_2O_3	1780		7.5	-	-	-	-	W	-	W	-	RF, DC, RF-R	-
Niobium (V) Oxide	Nb_2O_5	1485		4.47	-	-	-	-	W	-	W	-	RF, RF-R	n = 1.95
Niobium Telluride	$NbTe_x$	-		7.6	-	-	-	-	-	-	-	-	RF	Composition variable.
Niobium-Tin	Nb_3Sn	-		-	-	-	-	Ex	-	-	-	-	RF, DC	Co-evaporate from two sources.
Osmium	Os	2700		22.48	2170	2430	2760	F	-	-	-	-	DC, RF	-
Osmium Oxide	Os_2O_3	-	D	-	-	-	-	-	-	-	-	-	-	Deposits osmium in 10^{-3} Torr oxygen.
Palladium	Pd	1554	S	12.02	842	992	1192	Ex	W	W	W	Al_2O_3, BeO	DC, RF	Alloys with refractory metals. Rapid evaporation suggested.
Palladium Oxide	PdO	870		9.70	-	-	575	-	-	-	-	Al_2O_3	RF-R	Decomposes.
Parylene	C_8H_8	300-400		1.1	-	-	-	-	-	-	-	-	-	Vapor-depositable plastic.

Permalloy	Ni/Fe	1395		8.7	947	1047	1307	G	W	-	-	Al_2O_3, VC	DC	F, Film low in nickel.
Phosphorus	P	44.1		1.82	327	361	402	-	-	-	-	Al_2O_3	-	Material reacts violently in air. n = 2.14
Phosphorus Nitride	P_3N_5	-		2.51	-	-	-	-	-	-	-	-	RF, RF-R	-
Platinum	Pt	1772		21.45	1292	1492	1747	Ex	W	W	W	C, ThO_2	DC, RF	Alloys with metals. Films soft, poor adhesion.
Platinum Oxide	PtO_2	450		10.2	-	-	-	-	-	-	-	-	RF-R	-
Plutonium	Pu	641		19.84	-	-	-	-	W	-	-	-	-	Toxic, radioactive.
Polonium	Po	254		9.4	117	170	244	-	-	-	-	Q	-	Radioactive.
Potassium	K	63		0.86	23	60	125	-	Mo	-	-	Q	-	Metal reacts rapidly in air. Preheat gently to outgas.
Potassium Bromide	KBr	734		2.75	-	-	~450	-	Ta, Mo	-	-	Q	RF	Preheat gently to outgas. n = 1.559
Potassium Chloride	KCl	770	S	1.98	-	-	510	G	Ta, Ni	-	-	-	RF	Preheat gently to outgas. n = 1.49
Potassium Fluoride	KF	858		2.48	-	-	~500	-	-	-	-	Q	RF	Preheat gently to outgas. n = 1.363
Potassium Hydroxide	KOH	360		2.04	-	-	~400	-	Pt	-	-	-	-	Preheat gently to outgas.
Potassium Iodide	KI	681		3.13	-	-	~500	-	Ta	-	-	-	RF	Preheat gently to outgas. n = 1.677
Praseodymium	Pr	931		6.77	800	950	1150	G	Ta	-	-	-	RF, DC	-
Praseodymium Oxide	Pr_2O_3	-	D	7.07	-	-	1400	G	Ir	-	-	ThO_2	RF, RF-R	Loses oxygen.
Radium	Ra	700		5 (?)	246	320	416	-	-	-	-	-	-	-
Rhenium	Re	3180		20.53	1928	2207	2571	P	-	-	-	-	DC, RF	Fine wire will self-evaporate.
Rhenium Oxide	ReO_3	-	D	~7	-	-	-	-	-	-	-	-	RF	Evaporate rhenium in 10^{-3} Torr
Rhodium	Rh	1966		12.4	1277	1472	1707	G	W	W	W	ThO_2, VC	DC, RF	E-beam gun preferred.

Rubidium	Rb	39		1.48	-3	37	111	-	-	-	-	Q	DC, RF	-
Rubidium Chloride	RbCl	718		2.09	-	-	~550	-	-	-	-	Q	RF	n = 1.493
Rubidium Iodide	RbI	647		3.55	-	-	~400	-	-	-	-	Q	RF	n = 1.647
Ruthenium	Ru	2310		12.3	1780	1990	2260	P	W	-	-	-	DC, RF	-

Material	Symbol	MP (°C)	S/D	g/cm^3	Temp.(°C) for Given Vap. Press. (Torr)			Evaporation Techniques					Sputter	Comments
									Thermal Sources					
					10^{-8}	10^{-6}	10^{-4}	E-Beam	Boat	Coil	Basket	Crucible		
Samarium	Sm	1074		7.52	373	460	573	G	Ta	-	-	Al_2O_3	RF, DC	-
Samarium Oxide	Sm_2O_3	2350		8.35	-	-	-	G	Ir	-	-	ThO_2	RF, RF-R	Loses oxygen. Films smooth, clear.
Samarium Sulfide	Sm_2S_3	1900		5.73	-	-	-	G	-	-	-	-	-	-
Scandium	Sc	1541		2.99	714	837	1002	Ex	W	-	-	Al_2O_3, BeO	RF	Alloys with tantalum.
Scandium Oxide	Sc_2O_3	2300		3.86	-	-	~400	F	-	-	-	-	RF, RF-R	-
Selenium	Se	217		4.81	89	125	170	G	W, Mo	W, Mo	W, Mo	Al_2O_3, VC	RF, DC	Toxic. Bad for vacuum systems.
Silicon	Si	1410		2.32	992	1147	1337	F	W, Ta	-	-	BeO, Ta, VC	DC, RF	Alloys with tungsten; use heavy tungsten boat. SiO produced above 4 x 10^{-6} Torr. E-beam best.

Silicon Boride	SiB_6	-		-	-	-	-	P	-	-	-	-	RF	-
Silicon Carbide	SiC	~2700	S, D	3.22	-	-	1000	-	-	-	-	-	RF	Sputtering preferred. n = 2.654, 2.697
Silicon Nitride	Si_3N_4	1900		3.44	-	-	~800	-	-	-	-	-	RF, RF-R	-
Silicon (II) Oxide	SiO	>1702	S	2.13	-	-	850	F	Ta	W	W	Ta	RF, RF-R	For resistance evaporation, use baffle box and low rate. n = 1.6
Silicon (IV) Oxide	SiO_2	1610		~2.65	*	*	1025*	Ex	-	-	-	Al_2O_3	RF	Quartz excellent in E-beam. n = 1.544, 1.553
Silicon Selenide	SiSe	-		-	-	-	550	-	-	-	-	Q	RF	-
Silicon Sulfide	SiS	940	S	1.85	-	-	450	-	-	-	-	Q	RF	n = 1.853
Silicon Telluride	$SiTe_2$	-		4.39	-	-	550	-	-	-	-	Q	RF	-
Silver	Ag	962		10.5	847	958	1105	Ex	W	Mo	Ta, Mo	Al_2O_3	W	DC, RF
Silver Bromide	AgBr	432	D	6.47	-	-	~380	-	Ta	-	-	Q	RF	n = 2.253
Silver Chloride	AgCl	455		5.56	-	-	~520	-	Mo, Pt	-	Mo	Q	RF	n = 2.07
Silver Iodide	AgI	558		6.01	-	-	~500	-	Ta	-	-	-	RF	n = 2.21
Sodium	Na	98		0.97	74	124	192	-	Ta, SS	-	-	Q	-	Preheat gently to outgas. Metal reacts quickly in air.n = 4.22
Sodium Bromide	NaBr	747		3.20	-	-	~400	-	-	-	-	Q	RF	Preheat gently to outgas. n = 1.641
Sodium Chloride	NaCl	801		2.17	-	-	530	G	Ta, W, Mo	-	-	Q	RF	Copper oven, little decomposition. Preheat gently to outgas. n = 1.544
Sodium Cyanide	NaCN	564		-	-	-	~550	-	Ag	-	-	-	RF	Preheat gently to outgas. n = 1.452
Sodium	NaF	993		2.56	-	-	~1000	G	Mo, Ta,	-	-	BeO	RF	Preheat gently to outgas. No

Fluoride									W					decomposition. n = 1.336
Sodium Hydroxide	NaOH	318		2.13	-	-	~470	-	Pt	-	-	-	-	Preheat gently to outgas. n = 1.358
Spinel	$MgO_3 5Al_2O_3$	-		8.0	-	-	-	G	-	-	-	-	RF	n = 1.72
Strontium	Sr	769		2.6	239	309	403	P	W, Ta, Mo	W	W	VC	RF, DC	Wets but does not alloy with refractory metals. May react in air.
Strontium Chloride	$SrCl_2$	875		3.05	-	-	-	-	-	-	-	-	-	n = 1.650
Strontium Fluoride	SrF_2	1473		4.24	-	-	~1000	-	-	-	-	Al_2O_3	RF	n = 1.442
Strontium Oxide	SrO	2430	S	4.7	-	-	1500	-	Mo	-	-	Al_2O_3	RF	Reacts with molybdenum and tungsten. n = 1.810
Strontium Sulfide	SrS	>2000		3.70	-	-	-	-	Mo	-	-	-	RF	Decomposes. n = 2.107
Sulfur	S_8	113		2.07	13	19	57	P	W	-	W	Q	-	Bad for vacuum systems. n = 1.957
Supermalloy	Ni/Fe/Mo	1410		8.9	-	-	-	G	-	-	-	-	RF, DC	Sputtering preferred; or co-evaporate from two sources, permalloy and molybdenum.
Tantalum	Ta	2996		16.6	1960	2240	2590	Ex	-	-	-	-	DC, RF	Forms good films.
Tantalum Boride	TaB_2	3000(?)		11.15	-	-	-	-	-	-	-	-	RF, DC	-
Tantalum Carbide	TaC	3880		13.9	-	-	~2500	-	-	-	-	-	RF, DC	-
Tantalum Nitride	TaN	3360		16.30	-	-	-	-	-	-	-	-	RF, RF-R, DC	Evaporates tantalum in 10^{-3} Torr nitrogen.
Tantalum Pentoxide	Ta_2O_5	1872		8.2	1550	1780	1920	G	Ta	W	W	VC	RF, RF-R	Slight decomposition.Evaporates in 10^{-3} Torr oxygen. n = 2.6
Tantalum Sulfide	TaS_2	>1300		-	-	-	-	-	-	-	-	-	RF	-

Technetium	Tc	2200		11.5	1570	1800	2090	-	-	-	-	-	-	-
Teflon	PTFE	330		2.9	-	-	-	-	W	-	-	-	RF	Baffled source. Film structure doubtful.
Tellurium	Te	452		6.25	157	207	277	P	W, Ta	W	W, Ta	Al_2O_3, Q	RF	Toxic. Wets without alloying. n =1.002
Terbium	Tb	1356		8.23	800	950	1150	Ex	Ta	-	-	Al_2O_3	RF	-
Terbium Fluoride	TbF_3	1172		-	-	-	~800	-	-	-	-	-	RF	-
Terbium Oxide	Tb_2O_3	2387		7.87	-	-	1300	-	Ir	-	-	-	RF	Partially decomposes.
Terbium Peroxide	Tb_4O_7	-	D	-	-	-	-	-	Ta	-	-	-	RF	Films TbO.
Thallium	Tl	304		11.85	280	360	470	P	W, Ta	-	W	Al_2O_3, Q	DC	Very toxic. Wets freely.
Thallium Bromide	TlBr	480	S	7.56	-	-	~250	-	Ta	-	-	Q	RF	Toxic. n = 2.4 - 2.8
Thallium Chloride	TlCl	430	S	7.00	-	-	~150	-	Ta	-	-	Q	RF	n = 2.247
Thallium Iodide	TlI	440	S	7.1	-	-	~250	-	-	-	-	Q	RF	n = 2.78
Thallium Oxide	Tl_2O_2	717		10.19	-	-	350	-	-	-	-	-	RF	Disproportionates at 850°C to Tl_2O.
Thorium	Th	1875		11.7	1430	1660	1925	Ex	W, Ta,Mo	W	W	-	-	Toxic, radioactive.
Thorium Bromide	$ThBr_4$	610	S	5.67	-	-	-	-	Mo	-	-	-	-	Toxic. n=2.47
Thorium Carbide	ThC_2	2655		8.96	-	-	~2300	-	-	-	-	C	RF, DC	Radioactive.
Thorium Fluoride	ThF_4	>900		6.32	-	-	~750	F	Mo	-	W	VC	RF	Radioactive.
Thorium Oxide	ThO_2	3220		9.86	-	-	~2100	G	W	-	-	-	RF, RF-R	Radioactive.

Thorium Oxyfluoride	$ThOF_2$	900		9.1	-	-	-	-	Mo, Ta	-	-	-	-	Radioactive. n = 1.52
Thorium Sulfide	ThS_2	1925		7.30	-	-	-	-	-	-	-	-	RF	Sputtering preferred; or co-evaporate from two sources.
Thulium	Tm	1545	S	9.32	461	554	680	G	Ta	-	-	Al_2O_3	DC	-
Thulium Oxide	Tm_2O_3	-		8.90	-	-	1500	-	Ir	-	-	-	RF	Decomposes.
Tin	Sn	232		7.28	682	807	997	Ex	Mo	W	W	Al_2O_3	DC, RF	Wets molybdenum. Use tantalum liner in E-beam guns.
Tin Oxide	SnO_2	1630	S	6.95	-	-	~1000	Ex	W	W	W	Q, Al_2O_3	RF, RF-R	Films from tungsten are oxygen deficient, oxidize in air. n = 2.0
Tin Selenide	SnSe	861		6.18	-	-	~400	G	-	-	-	Q	RF	-
Tin Sulfide	SnS	882		5.22	-	-	~450	-	-	-	-	Q	RF	-
Tin Telluride	SnTe	780	D	6.48	-	-	~450	-	-	-	-	Q	RF	-
Titanium	Ti	1660		4.5	1067	1235	1453	Ex	W	-	-	TiC	DC, RF	Alloys with refractory metals; evolves gas on first heating.
Titanium Boride	TiB_2	2900		4.50	-	-	-	P	-	-	-	-	RF, DC	-
Titanium Carbide	TiC	3140		4.93	-	-	~2300	-	-	-	-	-	RF, DC	-
Titanium Nitride	TiN	2930		5.22	-	-	-	G	Mo	-	-	-	RF, RF-R, DC	Sputtering preferred. Decomposes with thermal evaporation.
Titanium (II) Oxide	TiO	1750		4.93	-	-	~1500	G	W, Mo	-	-	VC	RF	Preheat gently to outgas. n = 2.2
Titanium (III) Oxide	Ti_2O_3	2130	D	4.6	-	-	-	G	W	-	-	-	RF	Decomposes.
Titanium (IV) Oxide	TiO_2	1830		4.26	-	-	~1300	F	W, Mo	-	W	-	RF, RF-R	Suboxide, must be reoxidized to rutile. Tantalum reduces TiO_2 to TiO and titanium. n = 2.616, 2.903

Tungsten	W	3410		19.35	2117	2407	2757	G	-	-	-	-	RF, DC	Forms volatile oxides. Films hard and adherent.
Tungsten Boride	WB_2	~2900		10.77	-	-	-	P	-	-	-	-	RF	-
Tungsten Carbide	W_2C	2860		17.15	1480	1720	2120	Ex	C	-	-	-	RF, DC	-
Tungsten Disulfide	WS_2	1250	D	7.5	-	-	-	-	-	-	-	-	RF	-
Tungsten Oxide	WO_3	1473	S	7.16	-	-	980	G	W, Pt	-	-	-	RF-R	Preheat gently to outgas. Tungsten reduces oxide slightly. n = 1.68
Tungsten Selenide	WSe_2	-		9.0	-	-	-	-	-	-	-	-	RF	-
Tungsten Silicide	WSi_2	>900		9.4	-	-	-	-	-	-	-	-	RF, DC	-
Tungsten Telluride	WTe_3	-		9.49	-	-	-	-	-	-	-	Q	RF	-
Uranium	U	1132		19.05	1132	1327	1582	G	Mo, W	W	W	-	-	Films oxidize.
Uranium Carbide	UC_2	2350		11.28	-	-	2100	-	-	-	-	C	RF	Decomposes.
Uranium Fluoride	UF_4	960		6.70	-	-	300	-	Ni	-	-	-	RF	-
Uranium (III) Oxide	U_2O_3	1300	D	8.30	-	-	-	-	W	-	W	-	RF-R	Disproportionates at 1300°C to UO_2.
Uranium (IV) Oxide	UO_2	2878		10.96	-	-	-	-	W	-	W	-	RF	Tantalum causes decomposition.
Uranium Phosphide	UP_2	-		8.57	-	-	1200	-	Ta	-	-	-	RF	Decomposes.
Uranium (II) Sulfide	US	>2000		10.87	-	-	-	-	-	-	-	-	-	-
Uranium (IV) Sulfide	US_2	>1100		7.96	-	-	-	-	W	-	-	-	RF	Slight decomposition.

Vanadium	V	1890		5.96	1162	1332	1547	Ex	W, Mo	-	-	-	DC, RF	Wets molybdenum. E-beam-evaporated films preferred. n = 3.03
Vanadium Boride	VB_2	2400		5.10	-	-	-	-	-	-	-	-	RF, DC	-
Vanadium Carbide	VC	2810		5.77	-	-	~1800	-	-	-	-	-	RF, DC	-
Vanadium Nitride	VN	2320		6.13	-	-	-	-	-	-	-	-	RF, RF-R, DC	-
Vanadium (IV) Oxide	VO_2	1967	S	4.34	-	-	~575	-	-	-	-	-	RF, RF-R	Sputtering preferred.
Vanadium (V) Oxide	V_2O_5	690	D	3.36	-	-	~500	-	-	-	-	Q	RF	n = 1.46, 1.52, 1.76
Vanadium Silicide	VSi_2	1700		4.42	-	-	-	-	-	-	-	-	RF	-
Ytterbium	Yb	819	S	6.96	520	590	690	G	Ta	-	-	-	DC, RF	-
Ytterbium Fluoride	YbF_3	1157		-	-	-	~800	-	Mo	-	-	-	RF	-
Ytterbium Oxide	Yb_2O_3	2346	S	9.17	-	-	~1500	-	Ir	-	-	-	RF, RF-R	Loses oxygen.
Yttrium	Y	1522		4.47	830	973	1157	Ex	W, Ta	W	W	Al_2O_3	RF, DC	High tantalum solubility.
Yttrium Aluminum Oxide	$Y_3Al_5O_{12}$	1990		-	-	-	-	G	-	W	W	-	RF	Films not ferroelectric.
Yttrium Fluoride	YF_3	1387		4.01	-	-	-	-	-	-	-	-	RF	-
Yttrium Oxide	Y_2O_3	2410		5.01	-	-	~2000	G	W	-	-	C	RF, RF-R	Loses oxygen, films smooth and clear. n = 1.79
Zinc	Zn	420		7.14	127	177	250	Ex	Mo, W, Ta	W	W	Al_2O_3, Q	DC, RF	Evaporates well under wide range ofconditions.
Zinc Antimonide	Zn_3Sb_2	570		6.33	-	-	-	-	-	-	-	-	RF	-

Zinc Bromide	$ZnBr_2$	394		4.20	-	-	~300	-	W	-	-	C	RF	Decomposes. n= 1.545
Zinc Fluoride	ZnF_2	872		4.95	-	-	~800	-	Pt, Ta	-	-	Q	RF	-
Zinc Nitride	Zn_3N_2	-		6.22	-	-	-	-	Mo	-	-	-	RF	Decomposes.
Zinc Oxide	ZnO	1975		5.61	-	-	~1800	F	-	-	-	-	RF-R	n = 2.008, 2.029
Zinc Selenide	ZnSe	>1100		5.42	-	-	660	-	Ta, W, Mo	W,Mo	W, Mo	Q	RF	Preheat gently to outgas. Evaporates well. n = 2.89
Zinc Sulfide	ZnS	1700	S	3.98	-	-	~800	G	Ta, Mo	-	-	-	RF	Preheat gently to outgas. Films partially decompose. Sticking coefficient varies with substrate temperature. n =2.356
Zinc Telluride	ZnTe	1239		6.34	-	-	~600	-	Mo, Ta	-	-	-	RF	Preheat gently to outgas. n = 3.56
Zirconium	Zr	1852		6.49	1477	1702	1987	Ex	W	-	-	-	RF, DC	Alloys with tungsten. <|>Films oxidize readily.
Zirconium Boride	ZrB_2	~3200		6.09	-	-	-	G	-	-	-	-	RF, DC	-
Zirconium Carbide	ZrC	3540		6.73	-	-	~2500	-	-	-	-	-	RF, DC	-
Zirconium Nitride	ZrN	2980		7.09	-	-	-	-	-	-	-	-	RF, RF-R, DC	Reactively evaporates in 10^{-3} Torr nitrogen.
Zirconium Oxide	ZrO_2	~2700		5.89	-	-	~2200	G	W	-	-	-	RF, RF-R	Films oxygen deficient, clear and hard. n = 2.13, 2.19, 2.20
Zirconium Silicate	$ZrSiO_4$	2550		4.56	-	-	-	-	-	-	-	-	RF	n = 1.92 - 1.96; 1.97 - 2.02
Zirconium Silicide	$ZrSi_2$	1700		4.88	-	-	-	-	-	-	-	-	RF, DC	-