METALS

MATERIAL COMPOSITION	TYPICAL PURITY	MELTING POINT C	DENSITY	TARGETS	EVAP. MATERIAL	E-BEAM STARTER SOURCE	SUGGESTED APPLICATIONS/ APPLICATION NOTES
Aluminum Al	99% – 99.9999%	660	2.7	○	○	○	Conductive film in IC's. High reflectivity front surface mirrors and reflectors on glass.
Antimony Sb	99.999%	630.5	6.62	○	○	○	Semiconducting films.
Arsenic As	99%, 99.99%, 99.999%	817	5.72	○	○	○	Toxic. Semiconductor. Diffusion layer.
Barium Ba	99.5%	714	3.5	○	○	○	Wets w/o alloying-reacts with ceramics.
Beryllium Be	98% – 99.9%	1277	1.85	○	○	○	Highly toxic. Semiconductor junctions.
Bismuth Bi	99.5%, 99.999%	271.3	9.8	○	○	○	Ferromagnetic and resistive thin films.
Boron B	99.9%	-2030	2.34	○	○	○	Semiconductor. Diffusion Layer.
Calcium Ca	99%	838	1.55	○	○	○	Corrodes in air.
Cadmium Cd	99.5%, 99.999%	320.9	8.65	○	○	○	Dielectric thin film. For metallizing paper, etc.
Carbon C	99.5%, 99.999%	3727g	2.26	○	○	○	Poor film adhesion.
Cerium Ce	99.9%	795	6.67	○	○	○	Film oxidizes easily.
Cesium Cs	99.95%	28.7	1.9		○	○	
Chromium Cr	99% – 99.99%	1875	7.18	○	○	○	Excellent adhering film on substrates. Deposit on glass for printed circuit base. Co-deposit with SiO for resistor films.
Cobalt Co	99.8%	1495	8.9	○	○	○	Ferromagnetic thin films.
Copper Cu	99.9%, 99.999%	1083	8.96	○	○	○	Junction films in integrated circuits. Contacts.
Dysprosium Dy	99.9%	1407	8.54		○	○	
Erbium Er	99.9%	1497	9.05		○	○	
Europium Eu	99.9%	826	5.26		○	○	
Gadolinium Gd	99.9%	1312	7.89		○	○	
Gallium Ga	99.999%, 99.9999%	29.8	5.91		○	○	
Germanium Ge	99.999%	937.4	5.32	○	○	○	High index film in infared filters.
Gold Au	99.9% 99.99%	1063	19.3	○	○	○	Contacts. Highly reflective films.
Hafnium Hf	99.9%	2222	13.1	○	○	○	Dielectric. Interference Layers.
Holmium Ho	99.9%	1461	8.8	○	○	○	
MATERIAL COMPOSITION	TYPICAL PURITY	MELTING POINT C	DENSITY	TARGETS	EVAP. MATERIAL	E-BEAM STARTER SOURCE	SUGGESTED APPLICATIONS/ APPLICATION NOTES
Indium In	99.99%, 99.999%	156.2	7.31	○	○	○	Superconducting films. Transistor contacts, diodes.

MATERIAL COMPOSITION	TYPICAL PURITY	MELTING POINT C	DENSITY	TARGETS	EVAP. MATERIAL	E-BEAM STARTER SOURCE	SUGGESTED APPLICATIONS/ APPLICATION NOTES
Iridium Ir	99.8%	2454	22.5	○	○	○	
Iron Fe	99.9%	1536	7.86	○	○	○	Magnetic and memory elements. Ferromagnetic thin films.
Lanthanum La	99.9%	920	6.17	○	○	○	
Lead Pb	99.9%, 99.99%	327.4	11.4	○	○	○	Semiconducting films. Cryogenic applications.
Magnesium Mg	99.9%, 99.99%	650	1.74	○	○	○	Diffusion with bismuth on glass to form ferromagnetic films.
Manganese Mn	99.9%	1245	7.43	○	○	○	Contacts for semiconductors. Adherence film.
Molybdenum Mo	99.95%	2610	10.2	○	○	○	Contacts. Hard, smooth film. Multilayer circuits.
Neodymium Nd	99.9%	1024	7	○	○	○	
Nickel Ni	99.99%, 99.995%	1453	8.9	○	○	○	Ferromagnetic films. Memory elements.
Niobium Nb	99.9%	2415	8.4	○	○	○	Anodic films for rectification.
Palladium Pd	99.95%	1552	12	○	○	○	Corrosion resistant contacts.
Platinum Pt	99.9%, 99.99%	1769	21.4	○	○	○	Corrosion resistant contacts. Co-evaporate with Si.
Praseodymium Pr	99.9%	935	6.77	○	○	○	Fine wire will self evaporate.
Rhenium Re	99.99%	3180	21	○	○	○	Contacts.
Rhodium Rh	99.8%	1966	12.4	○	○	○	
Rubidium Rb	99.8%	38.9	1.53	○	○	○	
Ruthenium Ru	99.5%	2500	12.2	○	○		Corrosion resistant contacts.
Samarium Sm	99.9%	1072	7.54	○	○	○	
Scandium Sc	99.9%	1539	3	○	○	○	
Selenium Se	99.999%	217	4.79	○	○	○	Photoconductive and rectifier films.
Silicon Si	99.999%	1410	2.33	○	○	○	Mechanical and chemical resistant coating. Interference filter.
Silver Ag	99.9%, 99.99%	960.8	10.5	○	○	○	Reflective film. Conductive contact. Bonding layer.
Stainless Steel SS	304,316			○	○	○	
Strontium Sr	98%	768	2.6	○	○	○	Wets but does not alloy with refractory metals. May react violently with air.
Tantalum Ta	99.95%	2996	16.4	○	○	○	Superconductor. Thin film capacitor.
Tellurium Te	99.999%	449.5	6.24	○	○	○	Blocking contact in thin film devices.
Terbium Tb	99.9%	1356	8.27	○	○	○	

Thallium Tl	99.999%	303	11.85		○	○	Wets freely, very toxic.
Thorium Th	99.8%	1750	11.7		○	○	Toxic, radioactive.
Thulium Tm	99.9%	1545	9.33		○	○	
Tin Sn	99.999%	231.9	7.3	○	○	○	Cryogenic switching devices.
Titanium Ti	99% - 99.995%	1668	4.51	○	○	○	Deposited film oxidized to TiO2 as beam splitter or insulator.
Tungsten W	99.95%	3410	19.3	○	○	○	Contacts. Hard, adherent film.
Vanadium V	99.8%	1900	6.1	○	○	○	Co-evaporate with SiO for resistor films.
Ytterbium Yb	99.9%	824	6.98	○	○	○	
Yttrium Y	99.9%	1509	4.47	○	○	○	
Zinc Zn	99.9%	419.5	7.14	○	○	○	Capacitor dielectric films. For metallizing paper, etc.
Zirconium Zr	99.9% — 99.999%	1852	6.49	○	○	○	Interference filter. On tungsten field emission characteristics.

ALLOYS

MATERIAL COMPOSITION	TYPICAL PURITY	TARGETS	EVAP. MATERIAL	E-BEAM STARTER SOURCE	SUGGESTED APPLICATIONS/ APPLICATION NOTES
Aluminum-Chromium (Al)x(Cr)1-x	99.99%	○	○	○	
Aluminum-Cobalt (Al)x(Co)1-x	99.95%	○	○	○	
Aluminum-Copper (Al)x(Cu)1-x	99.9% - 99.9999%	○	○	○	Conductor contacts in microcircuits.
Aluminum-Iron (Al)x(Fe)1-x	99.99%	○	○	○	
Aluminum-Silicone (Al)x(Si)1-x	99.9% - 99.9999%	○	○	○	Conductor contacts in microcircuits.
Aluminum-Silicon-Copper (Al)x(Si)y(Cu)z	99.9% - 99.9999%	○	○	○	Conductor contacts in microcircuits.
Aluminum-Titanium (Al)50(Ti)50	99.95%	○	○	○	
Chromium-Silicon-Monoxide (Al)x(SiO)1-x	99.9% -	○	○	○	Excellent thin film resistors for integrated circuits.
MATERIAL COMPOSITION	TYPICAL PURITY	TARGETS	EVAP. MATERIAL	E-BEAM STARTER SOURCE	SUGGESTED APPLICATIONS/ APPLICATION NOTES
Chromium-Nickel (Cr)x(Ni)1-x	99.9%	○	○	○	
Chromium-Cobalt (Cr)x(Co)1-x	99.95%	○	○	○	
Chromium-Cobalt-Nickel (Cr)x(Co)y(Ni)z	99.95%,	○	○	○	
Cobalt-Nickel (Co)x(Ni)1-x	99.95%	○	○	○	Magnetic films.
Iron-Nickel (Permalloy) (Fe)19(Ni)81	99.9%	○	○	○	
Indium-Tin (In)x(Sn)1-x	99.99%, 99.999%	○	○	○	Oxidize to give transparent, conductive films.

Nickel-Vanadium (Ni)93(V)07	99.999%	○	○	○	Used in circuits, vanadium renders nickel non-magnetic.
Titanium-Tungsten* (Ti)10(W)90	99.9%, 99.995%	○	○	○	Diffusion barriers, primarily between Pt. silicide contacts and other interconnects.

SUPERCONDUCTING ALLOYS

MATERIAL COMPOSITION	TYPICAL PURITY	TARGETS	EVAP. MATERIAL	E-BEAM STARTER SOURCE	SUGGESTED APPLICATIONS/ APPLICATION NOTES
Yttrium-Barium-Copper Oxide 1-2-3	99.9% - 99.999%	○	○		
Bismuth-Calcium-Strontium-Copper Oxide 2-2-2-3	99.9% - 99.999%	○	○		
Bismuth-Lead-Calcium-Strontium-Copper Oxide 1.94-0.06-2-2-3	99.9% - 99.999%	○	○		
Thallium-Barium-Calcium-Copper Oxide 2-2-2-3	99.9% - 99.999%	○	○		
Erbium-Barium-Copper Oxide 1-2-3	99.9% - 99.999%	○	○		
Ytterbium-Barium-Copper Oxide 1-2-3	99.9% - 99.999%	○	○		

OXIDES

MATERIAL COMPOSITION	TYPICAL PURITY	MELTING POINT C	DENSITY	TARGETS	EVAP. MATERIAL	E-BEAM STARTER SOURCE	SUGGESTED APPLICATIONS/ APPLICATION NOTES
Aluminum Oxide Al2O3	99.9% 99.95%	2020	3.97	○	○	○	Protection of aluminum mirrors. High temperature dielectric.
Antimony Oxide Sb2O3	99.99%	656	5.67	○	○	○	Dielectric interference filter for ultraviolet radiation; use with cryolite.
Barium Titanate BaTiO3	99.9%	1654	5.8	○	○	○	Thin-film capacitor.
Bismuth Oxide Bi2O3	99.9% - 99.999%	820	8.9	○	○	○	Beam splitter.
Bismuth Titanate B14Ti3O12	99.9%	N/A	8.11	○	○	○	Beam splitter. Base coating for gold films for heating elements on glass.
Cerium Oxide CeO2	99.9%	2395	7.123	○	○	○	High Index film; multilayer; anti-reflection coating.
Chromium Oxide Cr2O3	99.9%	2435	5.21	○	○	○	Absorbent brown film with medium index.
MATERIAL COMPOSITION	TYPICAL PURITY	MELTING POINT C	DENSITY	TARGETS	EVAP. MATERIAL	E-BEAM STARTER SOURCE	SUGGESTED APPLICATIONS/ APPLICATION NOTES
Copper Oxide CuO, Cu2O	99.9%	1326	6.4	○	○	○	
Dysprosium Oxide Dy2O3	99.9%	2250	7.81	○	○	○	
Erbium Oxide Er203	99.9%	2400	8.64	○	○	○	
Europium Oxide Eu2O3	99.5%	2000	7.42	○	○	○	
Gallium Oxide Ga2O3	99.999%	1900	6.44	○	○	○	Dielectric film.
Germanium Oxide GeO2	99.999%	1086	4.228	○	○	○	Dielectric film.
Hafnium Oxide HfO2	99%	2812	9.68	○	○	○	Dielectric coating. Very hard, adherent film.
Indium Oxide In2O3	99.99% - 99.999%	1565	7.179	○	○	○	Transparent conductive film in electro-optical displays of the liquid crystal, electro-luminescent and gas discharge types.

Indium Tin Oxide $(In_2O_3)_x(SnO_2)_{1-x}$	99.9% - 99.999%	1500	N/A	○	○	○	Transparent conductive film in electro-optical displays of the liquid crystal, electro-luminescent and gas discharge types.
Iron Oxide Fe_2O_3	99.5% - 99.9%	1565	5.24	○	○	○	Beam splitter and interference layers. Magnetic films.
Lead Titanate $PbTiO_3$	99.9%	N/A	7.52	○	○	○	Thin film capacitors.
Magnesium Oxide MgO	99.5% - 99.95%	2800	3.58	○	○	○	High temperature dielectric.
Manganese Oxide MnO, MnO_2	99.9%	N/A	5.43 5.026	○	○	○	
Molybdenum Oxide MoO_2, MoO_3	99.9%	N/A	4.69	○	○	○	Luminescent coatings.
Neodymium Oxide Nd_2O_3	99.9%	1900	7.24	○	○	○	
Nickel Oxide NiO	99.9%	1990	6.67	○	○	○	
Niobium Oxide Nb_2O_5	99.5%, 99.95%	1460	4.47	○	○	○	Dielectric coating. Multilayers.
Praseodymium Oxide Pr_2O_3	99.9%	2125	7.07	○	○	○	Reactive to radio frequency.
Samarium Oxide Sm_2O_3	99.9%	1610	N/A	○	○	○	
Silicon Dioxide SiO_2	99.9% - 99.999%	1710	2.32	○	○	○	Hard durable film with low index. Insulating layer.
Silicon Monoxide SiO	99.9% - 99.99%	1702	2.13	○	○	○	Protective film for front surface aluminized mirrors. Low index layer for infared filters.
Strontium Oxide SrO_2	99.5%	215	4.56	○	○	○	
Tantalum Oxide Ta_2O_5	99.95%	1800	7.53	○	○	○	Dielectric film. Multilayers.
Thorium Oxide ThO_2	99.99%	3220	9.86	○	○	○	Radioactive. Highly durable beam splitter.
MATERIAL COMPOSITION	**TYPICAL PURITY**	**MELTING POINT C**	**DENSITY**	**TARGETS**	**EVAP. MATERIAL**	**E-BEAM STARTER SOURCE**	**SUGGESTED APPLICATIONS/ APPLICATION NOTES**
Tin Oxide SnO_2	99.9% - 99.99%	1630	6.95	○	○	○	Transparent conductive film. Also utilized in varistors.
Titanium Oxide TiO_2	99.9% - 99.995%	N/A	4.24	○	○	○	High index film, multilayer interference filters.
Tungsten Oxide WO_3, $WO_{2.9}$	99.9%	1479	7.16	○	○	○	Shadow casting for electron microscopy.
Yttrium Oxide Y_2O_3	99.9%	2410	5.01	○	○	○	Hard film. Dielectric coating. Thin film capacitor.
Zinc Oxide ZnO	99.9%	2980	5.606	○	○	○	Dielectrics, found in varistors, and gas sensors.
Zirconium Oxide ZrO_2+A12	99.7%	2700	5.6	○	○	○	Multilayers. Dielectric coating. Adherent coating with high refractive index.

TELLURIDES

MATERIAL COMPOSITION	TYPICAL PURITY	MELTING POINT C	DENSITY	TARGETS	EVAP. MATERIAL	E-BEAM STARTER SOURCE	SUGGESTED APPLICATIONS/ APPLICATION NOTES
Cadmium Telluride CdTe	99.999%	1098	5.85	○	○	○	Photoconductive film.
Lead Telluride PbTe	99.999%	917	8.164	○	○	○	High-index film for infared filters and detectors.
Molybdenum Telluride $MoTe_2$	99.9%	N/A	7.7	○	○	○	Lubricant film.

Niobium Telluride NbTe2	99.8%	N/A	7.6	○	○	○	Lubricant film.
Tantalum Telluride TaTe2	99.8%	N/A	9.4	○	○	○	Lubricant film.
Tungsten Telluride WTe2	99.8%	N/A	9.4	○	○	○	Lubricant film.
Zinc Telluride ZnTe	99.99%	1302	6.34	○	○	○	Thermionic power generators.

SELENIDES

MATERIAL COMPOSITION	TYPICAL PURITY	MELTING POINT C	DENSITY	TARGETS	EVAP. MATERIAL	E-BEAM STARTER SOURCE	SUGGESTED APPLICATIONS/ APPLICATION NOTES
Cadmium Selenide CdSe	99.999%	1264	5.81	○	○	○	Photoconductive film.
Lead Selenide PbSe	99.999%	1065	8.1	○	○	○	Photoconductive film.
Molybdenum Selenide MoSe2	99.9%	N/A	6.9	○	○	○	Lubricant film.
Niobium Selenide NbSe2	99.8%	N/A	6.3	○	○	○	Lubricant film, electrically conductive.
Tantalum Selenide TaSe2	99.8%	N/A	8.6	○	○	○	Lubricant film.
Tungsten Selenide WSe2	99.8%	N/A	9.0	○	○	○	Lubricant film.
Zinc Selenide ZnSe	99.99%	1526	5.4	○	○	○	Multilayers, photoconductive, Infared films and filters.

SILICIDES

MATERIAL COMPOSITION	TYPICAL PURITY	MELTING POINT C	DENSITY	TARGETS	EVAP. MATERIAL	E-BEAM STARTER SOURCE	SUGGESTED APPLICATIONS/ APPLICATION NOTES
Chromium Silicide $CrSi_2$, Cr_3Si	99.5%	N/A	4.9 6.52	○	○	○	Silicides in general are used for resistance and Semiconducting films. They are currently being used for fabrication of interconnections and gate
Cobalt Silicide $CoSi_2$	99%	1277	5.3	○	○	○	electrodes in IC Devices, where stoichiometry and low sodium content are required. New applications include metallization for MESFE technology on
Hafnium Silicide $HfSi_2$	99.5%	1750	8.03	○	○	○	GaAs; as a base in metal bipolar transistors. As a ring contact to specially made bipolar transistors. Silicides are being investigated for use as
Molybdenum Silicide $MoSi_2$	99.5%, 99.995%	N/A	6.24	○	○	○	diffusion barriers in both silicon and III-V devices. Device technology in multilevel metallization schemes. Decomposes aluminum as a second level.
Niobium Silicide $NbSi_2$	99.5%	N/A	5.72	○	○	○	
Tantalum Silicide $TaSi_2$	99.5%, 99.995%	N/A	9.14	○	○	○	
Titanium Silicide $TiSi_2$, Ti_5Si_3	99.5%	N/A	4.2 4.32	○	○	○	
Tungsten Silicide WS_2	99.5%	2900	9.28	○	○	○	
Vanadium Silicide VSi_2, V_3Si	99.5%	N/A	4.71 5.67	○	○	○	
Zirconium Silicide $ZrSi_2$	99.5%	N/A	4.71	○	○	○	

SULFIDES

MATERIAL COMPOSITION	TYPICAL PURITY	MELTING POINT C	DENSITY	TARGETS	EVAP. MATERIAL	E-BEAM STARTER SOURCE	SUGGESTED APPLICATIONS/ APPLICATION NOTES
Cadmium Sulfide CdS	99.99%	1405	4.8	○	○	○	Photoconductive film.
Lead Sulfide PbS	99.9%	1114	7.5	○	○	○	Metallic, high reflecting film.
Molybdenum Sulfide MoS_2	99%	1185	5.1	○	○	○	Lubricant film on bearings and other moving parts.
Tantalum Sulfide TaS_2	99.9%	1300	6.9	○	○	○	Lubricant film on bearings and other moving parts.
Tungsten Sulfide WS_2	99.9%	1250	7.5	○	○	○	Lubricant film on bearings and other moving parts.
Zinc Sulfide ZnS	99.99%	1830	4.1	○	○	○	Multilayers. High-index film for non-absorbing beam splitter.

CARBIDES

MATERIAL COMPOSITION	TYPICAL PURITY	MELTING POINT C	DENSITY	TARGETS	EVAP. MATERIAL	E-BEAM STARTER SOURCE	SUGGESTED APPLICATIONS/ APPLICATION NOTES
Boron Carbide B_4C	99.5%	2350	2.51	○	○	○	Carbides in general are used for wear-resistant films and semi-conducting films.
Chromium Carbide Cr_3C_2	99.5%	1890	6.66	○	○	○	Carbides are being investigated for use as diffusion barriers in both silicon and III -V technology in multilevel
Hafnium Carbide HfC	99.5%	3890	12.7	○	○	○	metallization schemes involving aluminum as a second level.
Molybdenum Carbide Mo_2C	99.5%	2687	9.18	○	○	○	
Niobium Carbide NbC	99.5%	3800	7.8	○	○	○	

MATERIAL COMPOSITION	TYPICAL PURITY	MELTING POINT C	DENSITY	TARGETS	EVAP. MATERIAL	E-BEAM STARTER SOURCE	SUGGESTED APPLICATIONS/ APPLICATION NOTES
Silicon Carbide SiC	99.5%, 99.9%	2700	3.21	○	○	○	

Tantalum Carbide TaC	99.5%	3880	14.5	○	○	○	
Titanium Carbide TiC	99.5%	N/A	4.93	○	○	○	
Tungsten Carbide WC	99.5%	N/A	15.7	○	○	○	
Vanadium Carbide VC	99.5%	2810	5.9	○	○	○	
Zirconium Carbide ZrC	99.5%	3540	6.56	○	○	○	

FLUORIDES

MATERIAL COMPOSITION	TYPICAL PURITY	MELTING POINT C	DENSITY	TARGETS	EVAP. MATERIAL	E-BEAM STARTER SOURCE	SUGGESTED APPLICATIONS/ APPLICATION NOTES
Barium Fluoride BaF2	99.9%	1280	4.9	○	○	○	Possible low-index film.
Calcium Fluoride CaF2	99.95%	1360	3.2	○	○	○	Anti-reflection coatings on glass.
Cerium Fluoride CeF3	99.9%	1342	6.2	○	○	○	Multilayers. Thin film capacitors.
Lanthanum Fluoride LaF3	99.9%	1750	N/A	○	○	○	Multilayers.
Lead Fluoride PbF2	99.9%	855	8.2	○	○	○	Possible position. Dielectric interference filter for ultra violet. High-index film in the ultraviolet.
Lithium Fluoride LiF	99.9%	870	2.6	○	○	○	Low-index, anti-reflection film.
Magnesium Fluoride MgF2	99.9%	1266	3.2	○	○	○	Widely used anti-reflection film.
Sodium Fluoride NaF	99.9%	993	2.56	○	○	○	
Yttrium Fluoride YF3	99.9%	1387	5.1	○	○	○	Possible use in multilayers.

NITRIDES

MATERIAL COMPOSITION	TYPICAL PURITY	MELTING POINT C	DENSITY	TARGETS	EVAP. MATERIAL	E-BEAM STARTER SOURCE	SUGGESTED APPLICATIONS/ APPLICATION NOTES
Aluminum Nitride AlN	99% 99.8%	2200	3.26	○	○	○	Nitrides in general show promise of increasing electrical stability of diodes, transistors, and integrated circuits.
Boron Nitride BN	99.9%	2300	3.26	○	○	○	They are currently being used for fabrication of interconnections and gate electrodes in IC devices, where
Hafnium Nitride HfN	99.5%	2852	2.25	○	○	○	stoichiometry and low sodium content are essential. New applications include metallization for MOSFET technology on
Niobium Nitride NbN	99.5%	2573	8.4	○	○	○	GaAs; as a base in metal base bipolar transistors, as a ring contact to specifically made bipolar transistors.
Silicon Nitride Si3N4	98% 99.9%	1900	3.44	○	○	○	
Tantalum Nitride TaN	99.5%	3360	16.3	○	○	○	

MATERIAL COMPOSITION	TYPICAL PURITY	MELTING POINT C	DENSITY	TARGETS	EVAP. MATERIAL	E-BEAM STARTER SOURCE	SUGGESTED APPLICATIONS/ APPLICATION NOTES
Titanium Nitride TiN	99.5%	2930	5.22	○	○	○	
Vanadium Nitride VN	99.5%	2320	6.13	○	○	○	
Zirconium Nitride ZrN	99.5%	2980	7.09	○	○	○	

BORIDES

MATERIAL COMPOSITION	TYPICAL PURITY	MELTING POINT C	DENSITY	TARGETS	EVAP. MATERIAL	E-BEAM STARTER SOURCE	SUGGESTED APPLICATIONS/ APPLICATION NOTES
Chromium-Boride CrB2	99.5%	842	4.356	○	○	○	Borides in general are used for wear-resistant films and to produce semi-conducting films.
Hafnium Boride HfB2	99.5%	3250	11.1	○	○	○	Titanium boride and zirconium boride films increase the life of cutting tools. Lanthanum boride films are thermonic
Lanthanum Boride LaB6	99.5%	2210	2.61	○	○	○	conductors. Boride films provide neutron-absorbing layers on nuclear fuel pellets. Borides are being investigated for use as
Molybdenum Boride Mo2B, Mo2B5	99.5%	N/A	7.48	○	○	○	diffusion barriers in both silicon and III-V device technology in multilevel metallization schemes involving
Niobium Boride NbB2, NbB	99.5%	2900	6.97	○	○	○	aluminum as a second level.
Tantalum Boride TaB2	99.5%	3000	12.6	○	○	○	
Titanium Boride TiB2	99.5%	2900	4.53	○	○	○	
Tungsten Boride WB, W2B	99.5%	N/A	16.0 17.1	○	○	○	
Vanadium Boride VB2	99.5%	2400	5.1	○	○	○	
Zirconium Boride ZrB2	99.5%	3040	6.085	○	○	○	

BULK PROPERTIES OF THIN FILM MATERIALS

Metal	Symbol	Atomic Weight	Atomic Radius (A)	Melting Point (°C)	Density		Modulus Of Elasticity (10 PSI)	Electrical Resistivity LL-ohm-m	Thermal Conductivity cal-cm/cm^2 sec°C	Coeff. of Thermal Exp. (cm/cm°C)×10^6
					g/cc	-lbs./In^2				
Aluminum	Al	26.98	1.43	660	2.699	0.098	10	26.55	0.53	23.6
Chromium	Cr	52.10	1.25	1875	7.19	0.259	36	130	0.16	6.2
Copper	Cu	63.54	1.28	1083	8.96	0.323	17	16.73	0.94	16.5
Germanium	Ge	72.60	1.22	937	5.32	0.192	23	.45 ohm m	0.14	5.7
Gold	Au	197.00	1.44	1063	19.32	10.166*	11.6	23.5	0.71	14.2
Indium	In	114.82	1.57	156	7.32	0.263	1.6	80**	0.057	33.0
Molybdenum	Mo	95.95	1.36	2610	10.22	0.369	47	52**	0.34	4.9
Nickel	Ni	58.71	1.25	1453	8.9	0.322	30	68.44	0.22	13.3
Palladium	Pd	106.70	1.37	1552	12.02	6.293*	16.3	108	0.17	11.7
Platinum	Pt	195.09	1.38	1769	21.45	11.287*	21.3	106	0.16	8.9
Silver	Ag	107.88	1.44	961	10.49	5.527*	11	14.7**	1.00	19.6
Tantalum	Ta	180.95	1.43	2996	16.6	0.601	27	135	0.13	6.5
Tin	Sn	118.70	1.509***	232	7.3	0.258	6	155	0.15	23.0
Titanium	Ti	47.90	1.47	1668	4.51	0.163	16.8	420	0.22	8.4
Zinc	Zn	65.38	1.33	419	7.13	0.258	13.4	59.16	0.27	39.7
Zirconium	Zr	91.22	1.58	1852	6.49	0.234	13.7	450	0.21	5.8

*toz/cu. in
**@0°C
***Lattice parameters
vary with structure

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