Zipro

Ceramic Material Solution Provider

www.ziprotech.com

ZIPRO GROUP

Ceramic Resources Vertical Integrator

ZIPRO TECHNOLOGY CORPORATION is a leading international advanced ceramic material solution provider, including zirconium material application, manufacturing, and supply. We offer a wide range of high quality products along with implementing vertical integration of zirconium related resources, to meet the various requirements application as high-speed 5G ceramic housing applications, zirconium 3D printing technology, and SOFC, etc. Through an effective manufacturing process, optimized design, and the unique properties of zirconium, we are able to achieve core competitiveness with our services and products.

Zipro is a subsidiary of VESTPRO INTERNATIONAL LTD., one of the largest shareholders of IMAGE RESOURCES (ASX listed: IMA) and one of the major shareholders of“THE WIM150 MINERAL SANDS PROJECT”, a zircon mineral development project in Australia.

Advanced Mineral Sands :
One stop Service Provider of Global Ceramic Resources

Zipro's strategic partnership with Image Resources (ASX: IMA) allows for high-quality supply and distribution of zirconium resources. IMA, based in West Australia, is an emerging Mineral Sands producer focus on the development of its Boonanarring project in the North Perth Basin, and continues to expand its resources and reserves with high grade Zirconium sand amongst other heavy metals.

Business Main Groups

Zircon Sand/Powder Ceramic Grinding Media

Zircon sand, ilmenite, rutile, zirconia powders and grinding media.

Ceramic Industrial Products Ceramic Consumer Products

Customized industrial/consumer zircon related structural ceramic units.

Ceramic 3D Slurry

Powders for 3D ceramic printing slurry with complex ceramic products.

Zirconia R&D Development

Focus on bioscience material develop and analyze especially at dental and bone composite material.

Mineral Resource

Zircon sand

Chemical Analysis (wt% by XRF)

Composition	Typical (%)	Guaranteed (%)
ZrO_2+HfO_2	65.1	65.0(Min)
Fe_2O_3	0.07	0.10(Max.)
TiO_2	0.19-0.25	0.25(Max.)
Al_2O_3	0.7-1.4	
SiO_2	33.0	
Total U+Th(ppm)	350	<500

Typical Particle Size Distribution

Aperture (μm)	Retained (wt%)	Cumulative (wt%)
300	0.05	0.05
212	1.71	1.76
150	26.88	28.64
106	57.84	86.48
75	13.27	99.75
<75	0.25	100

Typical Physical Properties

Physical Property	Typical
Bulk Density	2700kg/m^3
Specific Gravity	4.6

Packaging

Standard packaging is available in bulk shipments and 2 tonne bulk bags.

Mineral Resource

Leucoxene G02

Chemical Analysis (wt% by XRF)

Composition	Typical (%)	Guaranteed (%)
TiO_2	87-90	87(min)
Al_2O_3	2.0-2.4	
SiO_2	13.-1.8	
CaO	0.03-0.05	
Cr_2O_3	0.24-0.32	
Fe_2O_3	3.4-4.2	
MgO	0.08-0.12	
MnO	0.02-0.04	
Nb_2O_5	0.20-0.25	
P_2O_5	0.05-0.1	
V_2O_5	0.13-0.18	
ZrO_2	1.2-1.7	
S	0.03-0.05	0.05(Max.)
Sn(ppm)	70-76	
Th(ppm)	200-300	
U(ppm)	18-24	
Total U+Th	220-330	
Moisture	<1.0	

Typical Particle Size Distribution

Aperture (μm)	Retained (wt%)	Passing (wt%)
300	0.15	99.7
250	0.51	99.2
212	2.28	96.9
180	8.07	88.8
150	14.2	74.6
125	28.4	46.2
106	25.8	20.4
90	11.2	8.43
75	5.32	3.10
53	2.79	0.31
<53	0.2	0.0

D50 135μm

Typical Physical Properties

Physical Property	Typical
Bulk Density	1726.5kg/m^3
Specific Gravity	3.50
Angle of Repose	30^O

Packaging

Standard packaging is available in bulk shipments and 2 tonne bulk bags.

Mineral Resource

SR Grade Ilmenite

Chemical Analysis (wt% by XRF)

Composition	Typical (%)	Guaranteed (%)
TiO_2	57.0	56.0(Min.)
Al_2O_3	1.2	1.3(Max.)
SiO_2	1.2	1.3(Max.)
CaO	0.03	
Cr_2O_3	0.06	
Fe_2O_3	39.0	
MgO	0.20	
MnO	1.2	
P_2O_5	0.3	
ZrO_2	0.35	
V_2O_5	0.18	
FeO	11.0	12.5(Max.)
U(ppm)	10-25	20(Max.)
Th(ppm)	50-250	220(Max.)
Total U+Th(ppm)		<500(Max.)

Typical Particle Size Distribution

Sieve(μm)/ Microns	Retained (wt%)	Cumulative (wt%)
300	0.8	0.8
250	2.1	2.9
212	6.7	9.6
180	14.2	23.8
150	26.8	50.6
125	25.8	76.4
106	14.3	90.7
75	8.5	99.2
-75	0.8	100

D50 typical 140-160μm

Typical Physical Properties

Physical Property	Typical
Bulk Density	2.7kg/m^3
Specific Gravity	4.6
Melting Point	2200 degrees Celsius

Sulphate Grade Ilmenite

Chemical Analysis (wt% by XRF)

Composition	Typical (%)	Guaranteed (%)
TiO_2	54.0	53.5(Min.)
Al_2O_3	1.3	1.4(Max.)
SiO_2	1.3	1.3(Max.)
CaO	0.03	
Cr_2O_3	0.06	
Fe_2O_3	40.0	
MgO	0.20	
MnO	1.2	
P_2O_5	0.02	
ZrO_2	0.35	
V_2O_5	0.18	
FeO	15.0	12.5(Min.)
U(ppm)	10-20	20(Max.)
Th(ppm)	100-150	160(Max.)
Total U+Th(ppm)		<180(Max.)

Typical Particle Size Distribution

Sieve(μm)/ Microns	Retained (wt%)	Cumulative (wt%)
300	0.8	0.8
250	2.1	2.9
212	6.7	9.6
180	14.2	23.8
150	26.8	50.6
125	25.8	76.4
106	14.3	90.7
75	8.5	99.2
-75	0.8	100

D50 typical 140-160μm

Typical Physical Properties

Physical Property	Typical
Bulk Density	2.7kg/m^3
Specific Gravity	4.6
Melting Point	2200 degrees Celsius

Zirconia Powders General Properties

Zirconium Oxychloride

Product Code	Chemical Formula	Analytical Value Typical Specifications							
		ZrO_2+HfO_2 (Min%)	SiO_2 (Max%)	Fe_2O_3 (Max%)	TiO_2 (Max%)	Na_2O (Max%)	Form & Appearance	Remarks	Applications
ZP-2-1	$ZrOCl_2 \cdot 8H_2O$	36.0	0.002	0.001	0.001	0.001	White Powder	High-purity	Textile, Leather, Rubber additive, Metal Surface Treating Agent, Coating Drying Agent, Ceramic Colored Glaze Catalyst, Water-proof Agent
ZP-2-2	$ZrOCl_2 \cdot 8H_2O$	35.0	0.004	0.002	0.002	0.003	White Powder	High-purity	

Zirconium Dioxide

Product Code	Chemical Formula	Analytical Value Typical Specifications									
		ZrO_2+HfO_2 (Min%)	SiO_2 (Max%)	Fe_2O_3 (Max%)	TiO_2 (Max%)	Na_2O (Max%)	Average Particle Size D_{50} (μm)	B.E.T (m^2/g)	Ig.Loss (Max%)	Form & Appearance	Applications
ZP-B1-G	ZrO_2	99.9	0.01	0.005	0.001	0.001	— —	1~4	0.2	White Powder	Ceramic catalyst, Polishing liquid, Synthetic diamond
ZP-B2-M60	ZrO_2	99.5	0.01	0.002	0.002	0.002	— —	1~4	0.2		Ceramic catalyst, Polishing liquid, Synthetic diamond
ZP-R1-2D0	ZrO_2	99.9	0.001	0.001	0.002	0.002	2~3	1~4	0.5		Plezoelectric ceramic, Ceramic capacitor, Other Ceramic catalyst
ZP-R2-3D0	ZrO_2	99.5	0.001	0.001	0.003	0.005	3~6	2~6	0.5		Plezoelectric ceramic, Ceramic capacitor, Other Ceramic catalyst
ZP-R3-6D0	ZrO_2	99.5	0.01	0.002	0.005	0.005	6~8	2~6	0.5		Plezoelectric ceramic, Ceramic capacitor, Other Ceramic catalyst
ZP-R4-G	ZrO_2	99.5	0.020	0.005	0.005	0.005	— —	2~6	0.5		Plezoelectric ceramic, Ceramic capacitor, Other Ceramic catalyst
ZP-R5- M60	ZrO_2	99.5	0.020	0.005	0.005	0.005	— —	2~6	0.5		Plezoelectric ceramic, Ceramic capacitor, Other Ceramic catalyst
ZP-R6- 1D0	ZrO_2	99.5/ 99.9	0.010	0.001	0.005	0.005	<1	3-7	0.5		Plezoelectric ceramic, Ceramic capacitor, Other Ceramic catalyst
ZP-R7- 1D0	ZrO_2	99.5/ 99.9	0.010	0.001	0.005	0.005	<1	3-7	0.5		Plezoelectric ceramic, Ceramic capacitor, Other Ceramic catalyst

Yttrium Stabilized Zirconia

Product Code	Chemical Formula	Analytical Value Typical Specifications										
		ZrO_2+HfO_2 (Min%)	Y_2O_3 (Max%)	Al_2O_3 (Max%)	SiO_2 (Max%)	Fe_2O_3 (Max%)	TiO_2 (Max%)	Na_2O (Max%)	Average Particle Size D_{50} (μm)	B.E.T (m^2/g)	Ig.Loss (Max%)	Form & Appearance
ZP-3Y4B-1D0	$(Y_2O_3)x(ZrO_2)_{1-x}$	94.0	5.40±0.25	0.229	0.008	0.001	0.001	0.005	<1.0	8.200	2.35	White Powder
ZP-3Y6-0D5	$(Y_2O_3)x(ZrO_2)_{1-x}$	94.0	5.30±0.25	0.231	0.013	0.002	0.001	0.005	<1.0	11-15	0.96	
ZP-3Y6B-1D0	$(Y_2O_3)x(ZrO_2)_{1-x}$	94.0	5.35±0.25	0.235	0.007	0.001	0.001	0.005	<1.0	1	2.73	
ZP-3Y7-0D5	$(Y_2O_3)x(ZrO_2)_{1-x}$	94.0	5.30±0.25	0.233	0.001	0.001	0.001	0.005	<1.0	6-9	0.38	
ZP-4Y-1D0	$(Y_2O_3)x(ZrO_2)_{1-x}$	92.0	7.2±0.25	0.05	0.020	0.003	0.002	0.005	<1.0	6-9	1.0	
ZP-8Y-1D0	$(Y_2O_3)x(ZrO_2)_{1-x}$	86.0	13.5±0.25	——	0.020	0.003	0.002	0.005	<1.0	——	1.0	

3Y : It means 3 mol% Y_2O_3 ‖ B : It means powder with binder.

3Y4B : Apply in big special-shaped structure parts ‖ 3Y6B : Apply in small special-shaped structure parts

3Y-7 / 3YAZr-7 : Apply in small casting and injection mould parts

Application : Advanced Ceramic, Structural Ceramic Parts, Grinding Ball and Solid Fuel Cell.

Calcia Stabilized Zirconia

Product Code	Chemical Formula	Analytical Value Typical Specifications							
		ZrO_2+HfO_2 (Min%)	CaO (Max%)	Al_2O_3 (Max%)	SiO_2 (Max%)	Fe_2O_3 (Max%)	TiO_2 (Max%)	MgO (Max%)	Granularity
ZSZCS	$CaOZrO_2$	95.0	3.5-4.5	0.35	0.3	0.08	0.02	——	30、40、100、200、325(mesh)
ZSZC	$CaOZrO_2$	95.0	3.0-3.6	0.35	0.3	0.08	0.02	——	
ZSZB	$CaOZrO_2$	95.0	4	0.3	0.20	0.10	0.20	0..05	

Zirconium Silicate

Grey white powder with good chemical stability.

Product Code	Chemical Formula	Analytical Value Typical Specifications						
		ZrO_2+HfO_2 (Min%)	Fe_2O_3 (Max%)	TiO_2 (Max%)	Whiteness	Average Particle Size D_{50}(μm)	Form & Appearance	Applications
ZP-S1-1D0	$ZrSiO_4$	65	0.1	0.15	95	1.031	Grey white Powder	Glass additive, sanitary ware, tiles and other ceramic glaze, micro granule, Brake Linings, Refraction
ZP-S2-1D0	$ZrSiO_4$	63.5	0.15	0.2	94	1.034		
ZP-S3-1D0	$ZrSiO_4$	60	0.25	0.4	91	1.034		

Fused Zirconia

Light yellow powder with good chemical stability.

Product Code	Chemical Formula	Analytical Value Typical Specifications							
		ZrO_2+HfO_2 (Min%)	SiO_2 (Max%)	Fe_2O_3 (Max%)	TiO_2 (Max%)	Al_2O_3 (Max%)	Average Particle Size D_{50}(μm)	Form & Appearance	Applications
ZP-GF9-1D0	ZrO_2	98.50	0.40	0.04	0.25	0.35	1	Light yellow Powder	Ceramic pigment, Glass additive, Refractory material, Nuclear power, Brake Linings, Refraction
ZP-GF9-2D5	ZrO_2	98.50	0.40	0.04	0.25	0.4	2.5~3.5		
ZP-GF3-5D0	ZrO_2	98.50	0.40	0.04	0.25	0.35	5~6		

Zirconium Sponge

Silver grey granular metal and of luster, melting point 1852°C, boiling point 4377°C, density 6.49. Zirconium can absorb hydrogen, nitrogen and oxygen easily. The chemical stability of zirconium is more stable in the air.

Product Code	Chemical Formula	Chemical Composition(%)								
		Zr+Hf	Hf	Ni	Cr	Al	Mg	Mn	Pb	Ti
HZr-1	Zr	>99.4	<3.0	<0.010	<0.020	<0.03	<0.06	<0.010	<0.005	<0.005
			V	Cl	Si	O	C	N	H	Fe
			<0.005	<0.13	<0.010	<0.1	<0.03	<0.010	<0.0125	<0.1
HZr-01	Zr	Zr	Hf	Co	Sn	Ni	Cr	Al	Mg	Mn
		>99.4	<0.008	<0.001	<0.005	<0.007	<0.010	<0.0075	<0.015	<0.0035
			Pb	Ti	V	Cd	Fe	Cl	Si	B
			<0.005	<0.005	<0.005	<0.00005	<0.08	<0.030	<0.007	<0.00005
			H	Cu	W	Mo	O	C	N	
			<0.0025	<0.003	<0.005	<0.005	<0.070	<0.010	<0.005	

Applications : Applied in aerospace, metallurgy, alloy additive, anti-corrosion equipment, getter and other industry.

Zirconia Grinding Media

Advantage of zirconia grinding media

- Long using life : lower total cost compared with other grinding media.
- Good stability : Corrosion resistance, can be used in acidic and alkaline material.
- Low Abrasion : prevent material from contamination, guarantee its purity and quality.
- High grinding efficiency : it has the highest efficiency and lowest abrasion in the whole grinding media market.

Y-TZP Material Properties

Physical Property	Unit	Typical Value
Hardness(HV)	HV	1200~1300
Thermal Expansion Coefficient	$10^{-6}/K$	9.6
Modulus of Elasticity	GPa	205
Fracture Toughness	$MPa \cdot m^{1/2}$	8-10
Density	g/cm^3	>5.95
Color		White

Chemical Composition	Unit	Typical Value
ZrO_2	wt%	>94%
Y_2O_3	wt%	5.3±0.25%
Al_2O_3	wt%	0.25
Fe_2O_3	wt%	< 0.002
Na_2O	wt%	< 0.005

Size / Model		Size Range(mm)	Roundness
Φ 0.3-0.4	ZP-GM-Φ03	±0.03	>90%
Φ 0.5	ZP-GM-Φ05	±0.07	
Φ 0.8	ZP-GM-Φ08	±0.07	>95%
Φ 1.0	ZP-GM-Φ1	±0.10	
Φ 2.0	ZP-GM-Φ2	±0.15	
Φ 5.0	ZP-GM-Φ5	±0.2	
Φ 10.0	ZP-GM-Φ10	±0.2	
Φ 20.0	ZP-GM-Φ20	±0.5	

Alumina Powders General Properties

Spherical Alumina

Product Code	Chemical Formula	Analytical Value Typical Specifications										
		Al_2O_3 (Min%)	Na+ (ppm)	Cl- (ppm)	pH	Electrical Conductivity (uS/cm)	Moisture Content (uS/cm)	Average Particle Size D10 (μm)	Average Particle Size D50 (μm)	Average Particle Size D90 (μm)	Average Particle Size D100 (μm)	Form & Appearance
ZNA1450W	Al_2O_3	99.3	1.74	2.32	6.44	6.10	0.05	28.85	47.58	73.48	——	White Powder
ZNA1300W	Al_2O_3	99.3	1.94	2.17	6.84	6.10	0.05	7.07	29.32	64.13	——	
ZNA1100W	Al_2O_3	99.9	5.0	1.1	7.4	7.3	——	4.8	9.8	21.5	52.5	
ZNA1050W	Al_2O_3	99.9	5.0	1.2	7.2	5.3	——	2.2	6.5	14.4	28.7	
ZNA1020W	Al_2O_3	99.9	3.3	1.4	7.2	5.6	——	1.06	2.83	5.52	8.40	

Application : MLCC, CCL, Thermal interface material, Ceramics, Abrasive grain, Spraying material.

Titanium Powders General Properties

Titanium Dioxide

Product Code	Chemical Formula	Analytical Value Typical Specifications										
		TiO_2 (Min%)	Fe (%)	S (%)	SiO_2 (%)	P_2O_5 (%)	Al_2O_3 (%)	Ca、Mg (%)	K、Na (%)	Average Particle Size D50 (μm)	Density (g/cm^3)	Ig.Loss (%)
ZNTP-209	TiO_2	99.0	≦0.010	≦0.03	≦0.10	≦0.10	—	≦0.15	≦0.20	0.5-1	≦3.9	≦0.5

Application : MLCC, CCL, Thermal interface material, Ceramics, Abrasive grain, Spraying material.

Other Powders General Properties

Spherical Silica

Product Code	Chemical Formula	Analytical Value Typical Specifications										
		SiO_2 (Min%)	Fe_2O_3 (Max%)	Na^+ (ppm)	Cl^- (ppm)	pH	Electrical Conductivity (uS/cm)	Moisture Content (uS/cm)	Specific Surface Area	Average Particle Size D_{50} (μm)	Average Particle Size D_{100} (μm)	Form & Appearance
ZNQ1035I	SiO_2	99.85	0.06	1.1	1.0	5.1	2.2	0.05	2.4	3.67	9.98	White Powder
ZNA1015I	SiO_2	99.85	0.06	1.2	1.3	5.2	10.5	0.05	12.5	1.75	6.70	

Note ： The spherical silica is produced by silica being belted in very high temperature flame. It has characters of high purity, excellent sphericity, low thermal stress etc.

Gallium Trioxide

Product Code	Chemical Formula	Analytical Value Typical Specifications									
		Ga_2O_3 (%)	Na (ppm)	Ca (ppm)	Mn (ppm)	Co (ppm)	Cu ((ppm)	In (ppm)	Pb (ppm)	Al (ppm)	S (ppm)
ZGA-1	Ga_2O_3	99.999	1.1	0.44	<0.05	<0.01	0.05	<0.01	<0.05	0.52	0.63
			Ti (ppm)	Zr (ppm)	Cd (ppm)	Mg (ppm)	Cr (ppm)	Fe (ppm)	Ni (ppm)	Zn (ppm)	Sn (ppm)
			<0.005	<0.05	<0.1	0.11	0.67	<0.05	0.37	<0.1	<0.5
			Bi (ppm)	Si (ppm)	Cl (ppm)	V (ppm)	As (ppm)	Mo (ppm)			
			<0.01	2.1	4.5	<0.01	<0.2	0.05			

Average Particle Size D_{50} (μm) : 4+/-1um

Lanthanum oxide

Product Code	Chemical Formula	Impurity Content								
		La_2O_3 (%)	Rare Earth Content							
			CeO_2 (%)	Pr_6O_{11} (%)	Nd_2O_3 (%)	Sm_2O_3 (%)	Eu_2O_3 (%)	Gd_2O_3 (%)	Tb_4O_7 (%)	Dy_2O_3 (%)	Ho_2O_3 (%)
ZLA-S04	La_2O_3	99.999	≦0.0001	≦0.0001	≦0.0001	0.00015	— —	— —	— —	— —	— —
			Er_2O_3 (%)	Tm_2O_3 (%)	Yb_2O_3 (%)	Lu_2O_3 (%)	Y_2O_3 (%)				
			— —	— —	— —	— —	0.00026				
			Non-Rare Earth Content								
			Fe_2O_3 (%)	SiO_2 (%)	CaO (%)	Cl^- (%)					
			≦0.0005	≦0.005	≦0.005	≦0.01					

Average Particle Size D_{50} (μm) : 1-2um

Ig.Loss ≦ 2.0

Other Powders General Properties

Lanthanum oxide

Product Code	Chemical Formula	Impurity Content									
		La_2O_3 (%)	Rare Earth Content								
			CeO_2 (%)	Pr_6O_{11} (%)	Nd_2O_3 (%)	Sm_2O_3 (%)	Eu_2O_3 (%)	Gd_2O_3 (%)	Tb_4O_7 (%)	Dy_2O_3 (%)	Ho_2O_3 (%)
			≦0.0002	≦0.0001	≦0.0001	≦0.0001	— —	— —	— —	— —	— —
			Er_2O_3 (%)	Tm_2O_3 (%)	Yb_2O_3 (%)	Lu_2O_3 (%)	Y_2O_3 (%)				
			— —	— —	— —	— —	0.00026				
ZLA-C06	La_2O_3	99.999	Non-Rare Earth Content								
			Fe_2O_3 (%)	SiO_2 (%)	CaO (%)	Cl- (%)					
			≦0.0005	≦0.003	≦0.002	≦0.01					
Average Particle Size D_{50} (μm) : 10-15um											
Ig.Loss ≦ 2.0											

Light Magnesium oxide

Product Code	Chemical Formula	Analytical Value Typical Specifications									
		MgO (Min%)	CaO (%)	HCl insoluble (SiO_2)%	Fe_2O_3 (%)	Sulfate (SiO_3)%	Screening Analysis (325 mesh)	Screening Analysis (220 mesh)	Loss on ignition (%)	Bulk Density (g/ml)	Average Particle Size D_{50} (μm)	Form & Appearance
ZMS-P90	MgO	90	≦2.0	≦1.6	≦1.0	— —	— —	≧95%	≦3.0	— —	— —	White Powder
ZMS-P97	MgO	96	≦1.5	≦0.5	≦0.10	≦0.5	≧99%	— —	≦3.0	0.35-0.45	4-8	
ZMS-XQ	MgO	98	≦1.0	≦0.15	≦0.05	≦0.2	≧99%	— —	≦3.5	0.20-0.40	2-5	
Product Code	Chemical Formula	MgO (Min%)	CaO (%)	HCl insoluble (SiO_2)	Fe_2O_3 (%)	Sulfate (SiO_4)%	Chloride (Cl)%	Screening Analysis (150 mesh)	Loss on ignition (%)	Bulk Density (g/ml)	Average Particle Size D_{50} (μm)	Specific Surface Area (BET)
ZMS-150	MgO	97	≦0.5	≦0.1	≦0.05	≦1.0	≦0.5	≦0.05	≦10.5	0.35-0.45	3-5	130~160m^2/g

Key Properties : Good Refractoriness, Corrosion Resistance e.g. Basic Steelmaking Slags, Sodium Hydroxide, Fe, Co, Ni, High Thermal Conductivity, Low Electrical Conductivity, Transparency to Infrared.

Applications : Refractories, Crucibles, Cements, Heating Elements, Thermocouple Tubes, Brake Linings, Plasma Display

* Above ZMS-P97 and ZMS-XQ are low-content-SiO_2 with make very low noise brake pads.
* ZMS-150 is high activity magnesium oxide grade, it is for paints, flame retardant fillers and reinforcing agents fillers, paper and plastics and rubber, cosmetics and auxiliary materials of various electronic materials.

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