

# Metal Wafer & Substrate

Ag	Cu	Li	Pb	W
Al	Fe	Mg	Pd	Ta
Au	Hf	Mo	Ti	Zr
	In	Ni	V	Zn

## 1. Ag -- Silver Single Crystal & Substrate

No.	Item	Description
1.	Ag(Silver) Single Crystal Substrate: <100>, 10x10x0.35-0.4 mm, 1 side polished	<u>Ag(Silver) Single Crystal Substrate:</u> Purity: 99.999% Size: 10x10x0.3-0.45 mm Surface finish: One side optical polished Surface finish (RMS or Ra): One side polished < 30A Orientation <100>
2.	Ag(Silver) Single Crystal Substrate: <110>, 10x10x0.5 mm, 1 side polished	<u>Ag(Silver) Single Crystal Substrate:</u> Purity: 99.999% Size: 10x10x0.5 mm Surface finish: One side optical polished Surface finish (RMS or Ra): One side polished < 30A Orientation <110>
3.	Ag(Silver) Single Crystal Substrate: <111>, 10x10x0.35-0.4 mm, 1 side polished	<u>Ag(Silver) Single Crystal Substrate:</u> Purity: 99.999% Size: 10x10x0.35 -0.4mm Surface finish: One side optical polished Surface finish (RMS or Ra): One side polished < 30A Orientation <111>

## 2. Al - Aluminium Crystal & Substrates (single crystal )

No.	Item	Description
1.	Aluminum Single Crystal Substrate: <100>, 2" Dia. x1.0 mm, 1 side polished	<u>Single crystal aluminum metallic substrate:</u> Purity: > 99.99% Size: 2" Dia x1.0 mm Surface finish: One side optical polished < 100A Application: substrates for metal, alloy film and biological materials Orientation <100> +/-2 deg.
2.	Aluminum Single Crystal Substrate: <100>, 8 mm Dia. x3.0 mm, 1 side polished	<u>Single crystal aluminum metallic substrate:</u> Purity: > 99.99% Size: 8mm Dia x3.0 mm Surface finish: One side optical polished < 100A Application: substrates for metal, alloy film and biological materials Orientation <100> +/-2 deg.
3.	Aluminum Single Crystal Substrate: <100>, 10x10x0.5 mm, 1 side polished	<u>Single crystal aluminum metallic substrate:</u> Purity: > 99.99% Size: 10x10x0.5 mm Surface finish: One side optical polished < 100A

		Application: substrates for metal, alloy film and biological materials Orientation <100> +/-2 deg.
4.	Aluminum Single Crystal Substrate: <100>, 10x10x1.0 mm, 1 side polished	<u>Single crystal aluminum metallic substrate:</u> Purity: > 99.99% Size: 10x10x1.0 mm Surface finish: One side optical polished < 100A Application: substrates for metal, alloy film and biological materials Orientation <100> +/-2 deg.
5.	Aluminum Single Crystal Substrate: <100>, 20x20x1.0 mm, 1 side polished	<u>Single crystal aluminum metallic substrate:</u> Purity: > 99.99% Size: 20x20x1.0 mm Surface finish: One side optical polished < 100A Application: substrates for metal, alloy film and biological materials Orientation <100> +/-2deg.
6.	Aluminum Single Crystal Substrate : <111>, 10x10x1.0 mm, 1 side polished	<u>Single crystal aluminum metallic substrate:</u> Purity: > 99.99% Size: 10x10x1.0 mm Surface finish: One side optical polished < 100A Application: substrates for metal, alloy film and biological materials Orientation: <111> +/-2deg.
7.	Aluminum Single Crystal Substrate: <110>, 10x10x1.0 mm, 1 side polished	<u>Single crystal aluminum metallic substrate:</u> Purity: > 99.99% Size: 10x10x1.0 mm Surface finish: One side optical polished < 100A Application: substrates for metal, alloy film and biological materials Orientation <110> +/-2deg.
8.	Aluminum Single Crystal Substrate: <111>, 20x20x1.0 mm, 1 side polished	<u>Single crystal aluminum metallic substrate:</u> Purity: > 99.99% Size: 20x20x1.0 mm; Surface finish: One side optical polished < 100A Application: substrates for metal, alloy film and biological materials Orientation <111> +/-2 deg.
9.	Aluminum Single Crystal Substrate: <110>, 20x20x1.0mm, 1 side polished	<u>Single crystal aluminum metallic substrate:</u> Purity: > 99.99% Size: 20x20x1.0mm Surface finish: One side optical polished < 100A Application: substrates for metal, alloy film and biological materials Orientation <110> +/-2 deg.
10.	Aluminum Foil for Battery Cathode Substrate (300mm Length x 295mm width x 45um thickness) - EQ-bcaf-15u	This aluminum foil ( 15 um ) is used as substrate for coating cathode materials in Li-Ion rechargeable battery research.  <u>Specifications:</u> Material: Aluminum , Purity > 99.9% Sell in roll only Length: 300m Width: 295mm Thickness: 15 um Density: 2.70 g·cm <sup>-3</sup> Net weight: 5.5 kg Tube weight: 1 kg Shipped in vacuum bag
11.	Aluminum Net Foil for Battery Cathode Substrate (240mm width x 45um thickness) - EQ-bcanf-45u	This aluminum net foil ( 45 um ) is used as substrate for coating cathode materials in Li-Ion rechargeable battery research.  <u>Specifications:</u> Material: Aluminum, Purity > 99.9% Sell in roll only

	Width: 240mm Thickness: 45 um Density: 2.70 g·cm <sup>-3</sup> Net weight: Tube weight: 1 kg Shipped in vacuum bag
--	-----------------------------------------------------------------------------------------------------------------------------------

### 3. Au - Gold Single Crystal & Substrate

No.	Item	Description
1.	Au(Gold) Single Crystal Substrate: <100>, 10x10x0.5 mm, 1 side polished	<u>Au(Gold) Single Crystal Substrate:</u> Purity: 99.999% Size: 10x10x0.5 mm Surface finish: One side optical polished Surface finish (RMS or Ra) : One side polished < 30A Orientation <100>
2.	Au(Gold) Single Crystal Substrate: <110>, 10x10x0.5 mm, 1 side polished	<u>Au(Gold) Single Crystal Substrate:</u> Purity: 99.999% Size: 10x10x0.5 mm Surface finish: One side optical polished Surface finish (RMS or Ra) : One side polished < 30A Orientation <110>
3.	Au(Gold) Single Crystal Substrate: <111>, 10x10x0.5 mm, 1 side polished	<u>Au(Gold) Single Crystal Substrate:</u> Purity: 99.999% Size: 10x10x0.5 mm Surface finish: One side optical polished Surface finish (RMS or Ra) : One side polished < 30A Orientation <111>

### 4. Cu - Substrates ( single crystal) & polycrystalline

No.	Item	Description
1.	Bi-Crystal Substrate of Cu: (100), 14° boundary, 10x10x1.5 mm, 1side polished	<u>Bi-Single crystal copper substrate:</u> Boundary angle : 14° Purity: > 99.9999% Size: 10x10x1.5 mm Orientation: <100> +/- 2 o Surface finish (RMS or Ra) : One side polished < 30A Packing: in 1000 class clean-room with vacuumed bag
2.	Cu Single Crystal Substrate: (100), 10x10x0.5 mm, 1side polished	<u>Single crystal copper metallic substrate:</u> Purity: > 99.9999% Size: 10x10x0.5 mm Orientation: <100> +/- 2 o Edge orientation available with high cost upon request ! Surface finish (RMS or Ra): One side polished < 30A Packing: in 1000 class cleanroom with vacuumed bag Application: substrates for metal, alloy film and biological materials
3.	Cu Single Crystal Substrate: (110), 10x10x0.5 mm, 1 side polished	<u>45Single crystal copper metallic substrate:</u> Purity: > 99.9999% Size: 10x10x0.5 mm Orientation: <110> +/- 2o Edge orientation available with high cost upon request ! Surface finish (RMS or Ra): One side polished < 30A

		<p>Packing: in 1000 class cleanroom with vacuumed bag                  Application: substrates for metal, alloy film and biological materials</p>
4.	<p>Cu Single Crystal Substrate: (111), 10x10x0.5 mm, 1 side polished</p>	<p><u>Single crystal copper metallic substrate:</u>                  Purity: &gt; 99.9999%                  Size: 10x10x0.5 mm                  Orientation: &lt;111&gt; +/- 2o                  Edge orientation available with high cost upon request !                  Surface finish (RMS or Ra): One side polished &lt; 30A                  Packing: in 1000 class cleanroom with vacuumed bag                  Application: substrates for metal, alloy film and biological materials</p>
5.	<p>Cu Single Crystal Substrate: (100), 10x10x1.0 mm, 1side polished</p>	<p><u>Single crystal copper metallic substrate:</u>                  Purity: &gt; 99.9999%                  Size: 10x10x1.0 mm                  Orientation: &lt;100&gt; +/- 2 o                  Edge orientation available with high cost upon request !                  Surface finish (RMS or Ra): One side polished &lt; 30A                  Packing: in 1000 class cleanroom with vacuumed bag                  Application: substrates for metal, alloy film and biological materials</p>
6.	<p>Cu Single Crystal Substrate: (110), 10x10x1.0 mm, 1 side polished,</p>	<p><u>Single crystal copper metallic substrate:</u>                  Purity: &gt; 99.9999%                  Size: 10x10x1.0 mm                  Orientation: &lt;110&gt; +/- 2o                  Edge orientation available with high cost upon request !                  Surface finish (RMS or Ra): One side polished &lt; 30A                  Packing: in 1000 class cleanroom with vacuumed bag                  Application: substrates for metal, alloy film and biological materials</p>
7.	<p>Cu Single Crystal Substrate: (111), 10x10x1.0 mm, 1 side polished</p>	<p><u>Single crystal copper metallic substrate:</u>                  Purity: &gt; 99.9999%                  Size: 10x10x1.0 mm                  Orientation: &lt;111&gt; +/- 2o                  Edge orientation available with high cost upon request !                  Surface finish (RMS or Ra): One side polished &lt; 30A                  Packing: in 1000 class cleanroom with vacuumed bag                  Application: substrates for metal, alloy film and biological materials</p>
8.	<p>Cu Metallic Substrate ( polycrystalline) 10x10x0.5mm, 1 side polished</p>	<p><u>Cu Metallic Substrate ( polycrystalline):</u>                  Purity :99.99%                  Size: 10x10x0.5 mm                  Orientation: N/A                  Surface finish (RMS or Ra): One side polished &lt; 30A                  Packing: in 1000 class cleanroom with vacuumed bag                  Application: substrates for metal, alloy film and biological materials</p>
9.	<p>Cu Single Crystal Substrate: (110), 20x20x1.0 mm, 1 side polished</p>	<p><u>Single crystal copper metallic substrate:</u>                  Purity: &gt; 99.9999%                  Size: 20x20x1.0 mm                  Orientation: &lt;110&gt; +/- 2o                  Edge orientation available with high cost upon request !                  Surface finish (RMS or Ra): One side polished &lt; 30A                  Packing: in 1000 class cleanroom with vacuumed bag                  Application: substrates for metal, alloy film and biological materials</p>
10.	<p>Cu Single Crystal Substrate: (111), 20x20x1.0 mm, 1 side polished</p>	<p><u>Single crystal copper metallic substrate:</u>                  Purity: &gt; 99.9999%                  Size: 20x20x1.0 mm                  Orientation: &lt;111&gt; +/- 2o                  Edge orientation available with high cost upon request !                  Surface finish (RMS or Ra): One side polished &lt; 30A                  Packing: in 1000 class cleanroom with vacuumed bag</p>

		Application: substrates for metal, alloy film and biological materials
11.	Cu Single Crystal Substrate: (100), 10mm Dia. x1.0 mm, 1 side polished,	<p><u>Single crystal copper metallic substrate:</u></p> <p>Purity: &gt; 99.9999%  Size: 10mm Dia x 1.0 mm thickness  Ori.: &lt;100&gt; +/-2 o  Edge orientation available with high cost upon request !  Surface finish (RMS or Ra): One side polished &lt; 30A  Packing: in 1000 class cleanroom with vacuumed bag  Application: substrates for metal, alloy film and biological material</p>
12.	Cu Single Crystal Substrate: (100), 2" Dia. x1.0 mm, 1 side polished,	<p><u>Single crystal copper metallic substrate:</u></p> <p>Purity: &gt; 99.9999%  Size: 2" Dia x 1.0 mm thickness  Ori.: &lt;100&gt; +/-2 o  Edge orientation available with high cost upon request !  Surface finish (RMS or Ra): One side polished &lt; 30A  Packing: in 1000 class cleanroom with vacuumed bag  Application: substrates for metal, alloy film and biological material</p>
13.	Cu Single Crystal Substrate: (110), 10mmDia. x1.0 mm, 1 side polished,	<p><u>Single crystal copper metallic substrate:</u></p> <p>Purity: &gt; 99.9999%  Size: 10mm Dia x 1.0 mm thickness  Ori.: &lt;110&gt; +/-2 o  Edge orientation available with high cost upon request  Surface finish (RMS or Ra): One side polished &lt; 30A  Packing: in 1000 class cleanroom with vacuumed bag  Application: substrates for metal, alloy film and biological material</p>
14.	Cu Single Crystal Substrate: (110), 2" Dia. x1.0 mm, 1 side polished,	<p><u>Single crystal copper metallic substrate:</u></p> <p>Purity: &gt; 99.9999%  Size: 2" Dia x 1.0 mm thickness  Ori.: &lt;110&gt; +/-2 o  Edge orientation available with high cost upon request  Surface finish (RMS or Ra) : One side polished &lt; 30A  Packing: in 1000 class cleanroom with vacuumed bag  Application: substrates for metal, alloy film and biological material</p>
15.	Cu Single Crystal Substrate: (111), 2" Dia. x1.0 mm, 1 side polished	<p><u>Single crystal copper metallic substrate:</u></p> <p>Purity: &gt; 99.9999%  Size: 2" Dia x 1.0 mm thickness  Ori.: &lt;111&gt; +/-2 o  Edge orientation available with high cost upon request  Surface finish (RMS or Ra): One side polished &lt; 30A  Packing: in 1000 class cleanroom with vacuumed bag  Application: substrates for metal, alloy film and biological material</p>
16.	Copper Foil for Battery Anode Substrate (190m length x 298mm width x 9um thickness) - EQ-bccf-9u	<p>This copper foil (9 um) is used as a substrate for coating anode materials in Li-Ion battery research.</p> <p><u>Specifications:</u>  Material: Copper, Purity&gt; 99.99%  Sold in roll only  Length: 190m  Width: 298mm  Thickness: 9 um  Density: 8.94 g·cm<sup>-3</sup>  Net weight: 5.5 kg  Tube weight: 1 kg  Shipped in vacuum bag</p>
17.	Copper Foil for Graphene Growth (150m length x 150mm width x 25um thickness) - EQ-	<p>This copper foil with 25 um thickness is best candidate as substrate for growing Graphene with tube furnace.</p>

	bccf-25u	<p><u>Specifications:</u>                  Material: Tough Pitch Copper, Purity&gt; 99.99%                  Tensile Strength: 28 kgf/mm                  Elongation: MIN3-8                  Hardness Test: 80HV                  Grain Size: 0.02mm                  Electric Conductivity: 97% @20C                  Resistivity: ≤0.017165 Ω·mm/m</p> <p>Sold in roll only                  Length: 150m                  Width: 150mm                  Thickness: 25 um                  Density: 8.94 g·cm<sup>-3</sup>                  Net weight: 5 kg                  Shipped in vacuum bag</p>
18.	Copper Net Foil for Battery Anode Substrate (240mm width x 55um thickness) - EQ-bccnf-55u	<p>This copper net foil (55 um) is used as a substrate for coating anode materials in Li-Ion battery research.</p> <p><u>Specifications:</u>                  Material: Copper, Purity&gt; 99.99%                  Sold in roll only                  Length:                  Width: 240mm                  Thickness: 55 um                  Density: 8.94 g·cm<sup>-3</sup>                  Net weight:                  Tube weight:                  Shipped in vacuum bag</p>

### 5. Fe - Stainless Steel Substrate ( Polycrystalline)

No.	Item	Description
1.	Polycrystal Fe foil : 1" x 1" x 0.5mm, as cold rolling	<p><u>Polycrystal Fe foil:</u>                  Purity: 99.99%                  Substrate dimension: 1" x 1" x 0.5mm                  Surface roughness: as cold rolling</p>
2.	Stainless Steel Foil: SS316 0.1mm Thick x 300mm W x 4000 mm L, SSF-316-300-01	<p><u>Polycrystalline SS316 stainless steel foil:</u>                  Foil dimension: 0.1 mm Thickness x 300mm Width x 4000 mm Length                  Surface fitness: as cold rolling                  Weight: ~1000 g</p>
3.	Stainless Steel Substrate ( SS301-polycrystalline): 1" Dia x 0.3 mm, as cold rolling	<p><u>Polycrystal SS301 stainless steel substrate:</u>                  Average Grain Size: 10~50 Microns ( No annealling )                  Substrate dimension: 25.4 diameter x 0.3 mm thickness, ( 1" Dia. x0.3 mm)                  Surface roughness: as cold rolling</p>
4.	Stainless Steel Substrate ( SS301-polycrystalline): 1" x 1" x 0.3 mm, as cold rolling	<p><u>Polycrystal SS301 stainless steel substrate:</u>                  Average Grain Size: 10~50 Microns ( No annealling )                  Substrate dimension: 25.4x25.4 x 0.3 mm, ( 1"x1"x0.3 mm)                  Surface roughness: as cold rolling</p>
5.	Stainless Steel Substrate ( SS316-polycrystalline): 1" x 1" x 0.5 mm, as cold rolling	<p><u>Polycrystal SS301 stainless steel substrate:</u>                  Average Grain Size: 10~50 Microns ( No annealling )                  Substrate dimension: 25.4x25.4 x 0.5 mm, ( 1"x1"x0.5 mm)                  Surface roughness: as cold rolling</p>

## 6. Hafnium( Hf)

No.	Item	Description
1.	Hafnium( Hf)	<p>Hafnium (Hf) is a chemical element with the symbol Hf and atomic number 72. A lustrous, silvery gray, tetravalent transition metal, hafnium chemically resembles zirconium and is found in zirconium minerals. Its existence was predicted by Dmitri Mendeleev in 1869. Hafnium was the penultimate stable isotope element to be discovered (rhenium was identified two years later). Hafnium is named for Hafnia, the Latin name for "Copenhagen", where it was discovered.</p> <p>Hafnium is used in filaments and electrodes. Some semiconductor fabrication processes use its oxide for integrated circuits at 45 nm and smaller feature lengths. Some superalloys used for special applications contain hafnium in combination with niobium, titanium, or tungsten.</p> <p>Hafnium's large neutron capture cross-section makes it a good material for neutron absorption in control rods in nuclear power plants, but at the same time requires that it be removed from the neutron-transparent corrosion-resistant zirconium alloys used in nuclear reactors.</p> <p>General Properties for Hafnium:</p> <p>Symbol: Hf                      Atomic Number: 72                      Atomic Weight: 178.49                      Density (near r.t): 13.31 g.cm<sup>-3</sup>                      Liquid density at m.p: 12g.cm<sup>-3</sup>                      Melting Point: 2233°C                      Boiling Point: 4603°C</p>

## 7. In - Indium Foil

No.	Item	Description
1.	Indium ( In ) Foil: 150 x150 x 0.1 mm - F-In-15015001	<p><u>Polycrystal In Foil:</u></p> <p>Purity: &gt; 99.99%</p> <p>Size: 0.10 mm thickness x 150mm width x 150 meter Length</p> <p>Surface finish: as cold rolling &lt; 100 A</p> <p>Packing: in double layers vacuumed bag, and drying agent between two layers</p> <p>Application: Heat sink and thermal interface material for wafers</p> <p>Indium Physical Properties:</p> <p>vapor pressure: &lt;0.01 mmHg ( 25 °C)</p> <p>assay: 99.999% trace metals basis</p> <p>form: foil</p> <p>resistivity: 8.37 μΩ-cm</p> <p>thickness: 0.1 mm</p> <p>mp: 156.6 °C(lit.)</p> <p>density: 7.3 g/mL at 25 °C(lit.)</p>

## 8. Li - Lithium Metal Foil

No.	Item	Description
1.	Lithium ( Li ) Foil: 30000mm Length x 35 mm Width x 0.17mm Thick Lib-LiF-30M	<p><u>Polycrystal Li metallic Foil:</u></p> <p>Purity: &gt; 99.99% Size: 30000mm Length x 35 mm Width x 0.17mm Thick Surface finish: as cold rolling &lt; 50 A Packing: In double layers vacuumed bag, and drying agent between two layers</p> <p>Lithium Foil Properties</p> <ul style="list-style-type: none"> <li>• Appearance: Silvery-white soft metal solid(turns dark gray in air)</li> <li>• Boiling Point: 1317</li> <li>• Melting Point: 180.5</li> <li>• Solubility in water: Reacts violently with water ("Dangerous when wet" labeled)</li> <li>• Specific Gravity: 0.534g/cc</li> <li>• Molecular Weight: 6.94</li> </ul>
2.	Lithium ( Li ) Foil: 35000mm Length x 76.5 mm Width x 0.06mm Thick Lib-LiF-35M	<p><u>Polycrystal Li metallic Foil:</u></p> <p>Purity: &gt; 99.99% Size: 35000mm Length x 76.5 mm Width x 0.06mm Surface finish: as cold rolling &lt; 50 A Packing: In double layers vacuumed bag, and drying agent between two layers</p> <p>Lithium Foil Properties</p> <ul style="list-style-type: none"> <li>• Appearance: Silvery-white soft metal solid(turns dark gray in air)</li> <li>• Boiling Point: 1317</li> <li>• Melting Point: 180.5</li> <li>• Solubility in water: Reacts violently with water ("Dangerous when wet" labeled)</li> <li>• Specific Gravity: 0.534g/cc</li> <li>• Molecular Weight: 6.94</li> </ul>

## 9. Mg - Metal Foil

No.	Item	Description
1.	Magnesium ( Mg ) Polycrystalline substrate , 10x10x2.0mm, as Cut	<p><u>Magnesium ( Mg ) Polycrystalline substrate:</u></p> <p>Purity: &gt; 99.95% Size: 10x10x2.0mm Surface finish: as Cut Packing: Vacuum sealed</p> <p><u>Mg Physical properties:</u></p> <p>Phase: solid Density (near r.t.): 1.738 g·cm<sup>-3</sup> Liquid density at m.p.: 1.584 g·cm<sup>-3</sup> Melting point: 923 K, 650 °C, 1202 °F Boiling point: 1363 K, 1091 °C, 1994 °F Heat of fusion: 8.48 kJ·mol<sup>-1</sup> Heat of vaporization: 128 kJ·mol<sup>-1</sup> Molar heat capacity: 24.869 J·mol<sup>-1</sup>·K<sup>-1</sup></p>
2.	Magnesium ( Mg ) Foil: 100mm Width x 0.1 mm thick x 1000 mm Length, McMg-Foil-18L-1000	<p><u>Polycrystal Mg metallic Foil:</u></p> <p>Purity: &gt; 99.9% Size: 0.1mm thickness x 100 mm width x 1000 mm Length Surface finish: as cold rolling &lt; 50 A Packing: in vacuumed bag</p>

		<p><u>Mg Physical properties:</u></p> <p>Phase: solid  Density (near r.t.): 1.738 g·cm<sup>-3</sup>  Liquid density at m.p.: 1.584 g·cm<sup>-3</sup>  Melting point: 923 K, 650 °C, 1202 °F  Boiling point: 1363 K, 1091 °C, 1994 °F  Heat of fusion: 8.48 kJ·mol<sup>-1</sup>  Heat of vaporization: 128 kJ·mol<sup>-1</sup>  Molar heat capacity: 24.869 J·mol<sup>-1</sup>·K<sup>-1</sup></p>
--	--	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

## 10. Mo - Molybdenum Substrates (polycrystalline)

No.	Item	Description
1.	Mo Polycrystalline Substrate: 1"x1" x 0.5 mm, two sides polished	<p><u>Polycrystalline Mo substrate:</u></p> <p>Purity: 99.9%  Average Grain Size: 10~50 Microns ( No annealing )  Substrate dimension: 1"x1" x 0.5 mm  Polishing: two sides as cool rolling  Surface roughness: &lt; 30A</p>
2.	Mo Polycrystalline Substrate: 10 x 10 x 0.5mm, two sides polished	<p><u>Polycrystalline Mo substrate:</u></p> <p>Purity: 99.9%  Average Grain Size: 10~50 Microns ( No annealing )  Substrate dimension: 10 x 10 x 0.5 mm  Polishing: two sides as cool rolling  Surface roughness: &lt; 30A</p>
3.	Mo - Molybdenum Polycrystalline Metallic Foil: 100mm x 100mm x 0.025mm(thickness),	<p><u>Mo - Molybdenum Polycrystalline Metallic Foil:</u></p> <p>Average Grain Size: 10~50 Microns ( No annealing )  Substrate dimension: 100mm x 100mm x 0.025mm(thickness),  Surface roughness: &lt; 30A</p>
4.	Mo - Molybdenum Polycrystalline Metallic Foil: 100mm x 100mm x 0.05mm(thickness),	<p><u>Mo - Molybdenum Polycrystalline Metallic Foil:</u></p> <p>Average Grain Size: 10~50 Microns ( No annealing )  Substrate dimension: 100mm x 100mm x 0.05mm(thickness),  Surface roughness: &lt; 30A</p>
5.	Mo - Molybdenum Polycrystalline Metallic Foil: 200mm x 100mm x 0.1mm(thickness),	<p><u>Mo - Molybdenum Polycrystalline Metallic Foil:</u></p> <p>Average Grain Size: 10~50 Microns ( No annealing )  Substrate dimension: 200mm x 100mm x 0.1mm(thickness),  Surface roughness: &lt; 30A</p>

# 11. Ni -Nickel Substrate & Foil (Single crystal and Polycrystalline )

## A. Ni -Polycrystalline & Foil

No.	Item	Description
1.	Ni Metallic Substrate ( polycrystalline): 1" x 1" x 0.5 mm, 1 side polished	Polycrystal Ni metallic substrate made from 2 mm thickness cold rolling Nickel plate Purity: > 99.9% Average Grain Size: 10~50 Microns ( No annealling ) Substrate dimension: 25.4x25.4 x 0.5 mm, ( 1"x1"x0.5mm) Surface finish: (RMS or Ra): < 30A,one side polished
2.	Ni Metallic Substrate ( polycrystalline): 10x10 x 0.5 mm, 1 side polished	Polycrystal Ni metallic substrate made from 2 mm thickness cold rolling Nickel plate Purity: > 99.9% Average Grain Size: 10~50 Microns ( No annealling ) Substrate dimension: 10x10 x 0.5 mm, Surface finish: (RMS or Ra) : < 30A,one side polished
3.	Ni Metallic Substrate ( polycrystalline): 2" x 2" x 1.0 mm, 1 side polished	Polycrystal Ni metallic substrate made from 2 mm thickness cold rolling Nickel plate Purity: > 99.9% Average Grain Size: 10 ~ 50 microns (without Annealling ) Substrate dimension: 50 x 50 x 1.0 mm, ( 2"x2"x 1.0 mm) Surface finish: (RMS or Ra): < 30A,one side polished
4.	Ni Metallic Substrate ( polycrystalline): 2" x 2" x 1.0 mm, 1 side polished	Polycrystal Ni metallic substrate made from 2 mm thickness cold rolling Nickel plate Purity: > 99.9% Average Grain Size: 10 ~ 50 microns (without Annealling ) Substrate dimension: 50 x 50 x 1.0 mm, ( 2"x2"x 1.0 mm) Surface finish: (RMS or Ra): < 30A,one side polished
5.	304 Stainless Steel Meshed Disc as Electrode Substrate for CR20XX Coin Cell -EQ-SSMD-304	This SS 304 meshed round disc can be easily single side coated by battery electrode material paste and directly put into CR20xx coin cell for testing purpose, it is very easy and convenient.  <u>Specifications:</u> Material: Stainless Steel, Purity> 99.9% Sold in box only Diameter: 15mm Thickness: 0.15mm Quantity: 100pcs Net weight: 128mg/pcs Application: Directly coat electrode material on it to collect current
6.	Nickel Foam for Battery Cathode Substrate (1000mm length x 300mm width x 1.6mm thickness) - EQ-bcnf-16m	Nickel Foam for Battery Cathode Substrate (1m length x 300mm width x 1.6mm thickness) EQ-bcnf-16m  <u>Specifications:</u> Material: Nickel Foam, Purity> 99.99% Sold in roll only Length: 1m Width: 300mm Thickness: 1.6 mm Net weight: 104g Surface Density: 346g/m <sup>2</sup> Porosity: ≥95% (80-110 Pores per Inch) Extensibility: Lengthwise≥5%; Widthwise≥12% Tensile Strength : Lengthwise≥1.25N/mm <sup>2</sup> ; Widthwise≥1.00N/mm <sup>2</sup>
7.	Nickel Foam for Battery or Supercapacitor Cathode Substrate (300mm length x 80mm	Nickel Foam for Battery Cathode Substrate (300mm length x 80mm width x 0.08mm thickness) - EQ-bcnf-80um

	width x 0.08mm thickness) - EQ-bcnf-80um	<p><u>Specifications:</u>                  Material: Nickel Foam, Purity&gt; 99.99%                  Sold in roll only                  Length: 300 mm                  Width: 80 mm                  Thickness: 0.08mm (80um)                  Net weight: 8.32g                  Surface Density before rolling: 346g/m<sup>2</sup>                  Porosity: ≥95% (80-110 Pores per Inch)                  Extensibility: Lengthwise≥5%; Widthwise≥12%                  Tensile Strength : Lengthwise≥1.25N/mm<sup>2</sup>; Widthwise≥1.00N/mm<sup>2</sup></p>
8.	Nickel Foil: (0.03mm thick x 150mm width x 5000 mm length ) - NFoil-25u	<p>0.025mm thickness Nickel Foil for graphene and other film deposition</p> <p><u>Specifications:</u>                  Material: Nickel, Purity&gt; 99.9%                  Sold in roll only                  Length: 5000 mm                  Width: 150 mm                  Thickness: 0.03mm (25um)                  Net weight: 200g                  Typical Physics Properties                  Purity: ≥99.9%                  Form: foil                  Resistivity: 6.97 μΩ-cm, 20°C                  Thickness: 0.125 mm                  Bp: 2732 °C(lit.)                  Mp: 1453 °C(lit.)                  Density: 8.9 g/mL at 25 °C(lit.)</p>

## B. Ni Single crystal

No.	Item	Description
1.	Ni Single Crystal Substrate, <100>, 10x10 x 0.5 mm, 1 side polished	<p><u>Ni Single crystal substrate:</u>                      Purity: &gt; 99.99%                      Orientation: &lt;100&gt; ±2°                      Edge orientation available with high cost upon request                      Substrate dimension: 10x10 x 0.5 mm                      Surface finish (RMS or Ra): &lt; 30A                      Paching: under 100 class clean room with vacuumed bag</p>
2.	Ni Single Crystal Substrate, <100>, 10x10 x 1.0 mm, 1 side polished	<p><u>Ni Single crystal substrate:</u>                      Purity: &gt; 99.99%                      Orientation: &lt;100&gt; ±2°                      Edge orientation available with high cost upon request                      Substrate dimension: 10x10 x 1.0 mm                      Surface finish (RMS or Ra): &lt; 30A                      Paching: under 100 class clean room with vacuumed bag</p>
3.	Ni Single Crystal Substrate, <110>, 10x10 x 0.5 mm, 1 side polished	<p><u>Single crystal Ni metallic substrate:</u>                      Purity: &gt; 99.99%                      Orientation: &lt;110&gt; ±2°                      Edge orientation available with high cost upon request                      Substrate dimension: 10x10 x 0.5 mm                      Surface finish: (RMS or Ra) : &lt; 30A,one side polished                      Paching: under 100 class clean room with vacuumed bag</p>
4.	Ni Single Crystal Substrate, <110>, 10x10 x 1.0 mm, 1 side polished	<p><u>Single crystal Ni metallic substrate:</u>                      Purity: &gt; 99.99%                      Orientation: &lt;110&gt; ±2°                      Edge orientation available with high cost upon request                      Substrate dimension: 10x10 x 1.0 mm</p>

		Surface finish: (RMS or Ra) : < 30A, one side polished Paching: under 100 class clean room with vacuumed bag
5.	Ni Single Crystal Substrate, <110>, 20x20 x 1.0 mm, 1 side polished	<u>Single crystal Ni metallic substrate:</u>  Single crystal is grown by special Bridgman method Purity: > 99.99% Orentation: <110> ±2° Edge orientation available with high cost upon request Substrate dimension: 20x20 x 1.0 mm Surface finish: (RMS or Ra) : < 30A, one side polished Paching: under 100 class clean room with vacuumed bag
6.	Ni Single Crystal Substrate, <110>, 30 Dia. x 1.0 mm, 1 side polished	<u>Single crystal Ni metallic substrate:</u>  Purity: > 99.99% Orentation: <110> ±2° Edge orientation available with high cost upon request Substrate dimension: 30 mm diameter x 1.0 mm Surface finish: Surface finish: (RMS or Ra) : < 30A, one side polished Paching: under 100 class clean room with vacuumed bag
7.	Ni Single Crystal Substrate, <111>, 10x10 x 0.5 mm, 1 side polished	<u>Single crystal Ni metallic substrate:</u>  Purity: > 99.99% Orentation: <111> ±2° Edge orientation available with high cost upon request Substrate dimension: 10x10 x 0.5 mm Surface finish: (RMS or Ra) : < 30A, one side polished Paching: under 100 class clean room with vacuumed bag
8.	Ni Single Crystal Substrate, <111>, 10x10 x 1.0 mm, 1 side polished	<u>Ni Single crystal substrate:</u>  Purity: > 99.99% Orentation: <111> ±2° Edge orientation available with high cost upon request Substrate dimension: 10x10 x 1.0 mm Surface finish: One side polished Roughness (RMS, Ra) < 30A Paching: under 100 class clean room with vacuumed bag

## 12. Pb - Lead Foil Tape

No.	Item	Description
1.	Lead Foil Tape: 2" W x 0.0063" Thick x 36 Yard length	100% pure lead foil tape coated with a compounded synthetic rubber adhesive system which exhibits excellent adhesion to a wide variety of surfaces, especially to metal, glass, films, foils, and papers. Highly malleable and can be shaped to the most intricate patterns.  <u>Physical Properties:</u>  Backing 5 mil lead foil Adhesive blended rubber Tape Thickness (w/o liner) 6.5 mil Peel Adhesion 96 oz/in Tensile strength 23 lbs/in 3" central core Temperature resistance 40 F to 180 F Elongation (at break) 30%  <u>Applications:</u>  Used as X-ray shield for X-ray machine Used for blocking X-ray from DX-100 X-ray orientation machine and MD-10 Compact XRD

	Used as an electromagnetic and radio frequency shield
--	-------------------------------------------------------

### 13. Pd - Palladium Foil

No.	Item	Description
1.	Palladium ( Pd ) Foil: 100 x100 x 0.10 mm thick, 4N purity	<p><u>Polycrystal Palladium metallic Foil:</u></p> <p>Purity: &gt; 99.99%</p> <p>Size: 0.10 mm thickness x 100 mm width x 100 mm Length</p> <p>Surface finish: as cold rolling &lt; 50 A</p> <p>Packing: in vacuumed bag</p> <p>Pd Physical properties</p> <p>Phase: solid</p> <p>Density(near r.t.): 12.023 g·cm<sup>-3</sup></p> <p>Liquid density at m.p.: 10.38 g·cm<sup>-3</sup></p> <p>Melting point: 1828.05 K, 1554.9 °C, 2830.82 °F</p> <p>Boiling point: 3236 K, 2963 °C, 5365 °F</p> <p>Heat of fusion: 16.74 kJ·mol<sup>-1</sup></p> <p>Heat of vaporization: 362 kJ·mol<sup>-1</sup></p> <p>Molar heat capacity: 25.98 J·mol<sup>-1</sup>·K<sup>-1</sup></p>

### 14. Ti - Titanium Substrate ( Polycrystalline)

No.	Item	Description
1.	Titanium (Ti) Metallic Substrate: 1"x0.5 mm, 1side polished	<p><u>Polycrystal Ti metallic substrate:</u></p> <p>Purity: &gt; 99.9%</p> <p>Density: 4.506 g/cm<sup>3</sup></p> <p>Melting Point: 1668°C</p> <p>Size: 1" dia x 0.5 mm</p> <p>Surface finish (RMS or Ra): One side polished &lt; 30A</p> <p>Application: substrates for metal, alloy film and biological materials</p>
2.	Titanium (Ti) Metallic Substrate: 1"x1"x0.5 mm, 1side polished	<p><u>Polycrystal Ti metallic substrate:</u></p> <p>Purity: &gt; 99.9%</p> <p>Density: 4.506 g/cm<sup>3</sup></p> <p>Melting Point: 1668°C</p> <p>Size: 1"x1"x0.5 mm,</p> <p>Surface finish (RMS or Ra): One side polished &lt; 30A</p> <p>Application: substrates for metal, alloy film and biological materials</p>
3.	Titanium (Ti) Metallic Substrate: 10x10x0.5 mm, 1side polished	<p><u>Polycrystal Ti metallic substrate:</u></p> <p>Purity: &gt; 99.9%</p> <p>Density: 4.506 g/cm<sup>3</sup></p> <p>Melting Point: 1668°C</p> <p>Size: 10x10x0.4 mm</p> <p>Surface finish (RMS or Ra): One side polished &lt; 30A</p> <p>Application: substrates for metal, alloy film and biological materials</p>
4.	Titanium (Ti) Metallic Substrate: 10x5x0.5 mm, 1side polished	<p><u>Polycrystal Ti metallic substrate:</u></p> <p>Purity: &gt; 99.9%</p> <p>Size: 10x5x0.5 mm</p> <p>Surface finish (RMS or Ra): One side polished &lt; 30A</p> <p>Application: substrates for metal, alloy film and biological materials</p>
5.	Titanium (Ti) Foil: 105mm Width x 0.1mm thick x 700 mm Length	<p><u>Polycrystal Ti metallic Foil:</u></p> <p>Purity: &gt; 99.9%</p> <p>Size: 0.1mm thickness x 105 mm width x 700 mm Length</p> <p>Surface finish: as cold rolling &lt; 50 A</p>

	Packing: in vacuumed bag Application: substrates for new generation solar cell and fuel cell
--	-------------------------------------------------------------------------------------------------

### 15. Vanadium( V ) substrate ( Polycrystalline)

No.	Item	Description
1.	Vanadium( V ) substrate ( Polycrystalline) , 10x10x0.5 mm, 1 side polished	<u>Vanadium( V ) substrate ( Polycrystalline):</u> Purity: 99.5% Size: 10x10x0.5 mm Surface finish: One side optical polished Surface finish (RMS or Ra): N/A
2.	Vanadium Foil (V) Foil: 0.127mm thickness x 50 mm width x 100 mm Length	<u>Vanadium (V) Metallic Foil:</u> Purity: 99.8% Size: 0.127mm thickness x 50 mm width x 100 mm Length Surface finish: as cold rolling < 50 A Packing: in vacuumed bag

### 16. W - Tungsten Polycrystalline Metal Substrates

No.	Item	Description
1.	W Polycrystalline Substrate: 1"x1"x0.5 mm, two sides polished	<u>Polycrystalline W ( Tungston) substrate:</u> Average Grain Size: 10~50 Microns (No annealing) Substrate dimension: 1"x1"x0.5 mm Polishing: two sides as cool rolling Surface roughness(RMS or Ra) < 30A
2.	W Polycrystalline Substrate: 10 x 10 x 0.5 mm, two sides polished	<u>Polycrystalline W ( Tungston) substrate:</u> Average Grain Size: 10~50 Microns (No annealing) Substrate dimension: 10 x 10 x 0.5 mm Polishing: two sides Surface roughness(RMS or Ra) < 30A
3.	W - Tungsten Polycrystalline Metallic Foil: 125 mm Width x 0.1mm thick x 200 mm Length	<u>Polycrystal W metallic Foil:</u> Purity: > 99.9% Size: 0.1mm thickness x 125 mm width x 200 mm Length Surface roughness(RMS or Ra) : as cold rolling < 50 A Packing: in vacuumed bag Application: substrates for new generation solar cell and fuel cell

### 17. Zn

No.	Item	Description
1.	Zn - Polycrystalline Substrate: 10 x 10 x0.5 mm, One sides polished	<u>Polycrystalline Zn substrate:</u> Purity: 99.5% Density: g/cm <sup>3</sup> Melting Point: °C Average Grain Size: Microns ( No annealing ) Substrate dimension: 10 x 10 x0.5 mm Polishing: One side polished and One sides as cool rolling Surface roughness: < 30A ( measured by AFM)

## 18. Zirconium Substrate & Foil ( Polycrystalline )

No.	Item	Description
1.	Zr - Polycrystalline Substrate: 10 x 10 x0.5 mm, One sides polished	<p><u>Polycrystalline Zr substrate:</u></p> <p>Purity: 99.5%            Density: 6.52 g/cm<sup>3</sup>            Melting Point: 1855°C            Average Grain Size: 10~50 Microns (No annealing)            Substrate dimension: 10 x 10 x0.5 mm            Polishing: One side polished and One sides as cool rolling            Surface roughness: &lt; 30A ( measured by AFM)</p>
2.	Zr - Polycrystalline Metallic Foil: 0.05mm thick x 200mm Width x 400 mm Length	<p><u>Polycrystal Zr metallic Foil:</u></p> <p>Density: 6.52 g/cm<sup>3</sup>            Melting Point: 1855°C            Purity: &gt; 99.5%            Size: 0.08mm thickness x 200 mm width x 400 mm Length            Surface finish: as cold rolling &lt; 50 A            Packing: in vacuumed bag</p>

### NovaScientific

**NovaScientific Resources (M) Sdn. Bhd.**

No. 12A-2A, Block A, Jalan PJU 1/3B, Sunwaymas Commercial Centre,  
 47301 Petaling Jaya, Selangor Darul Ehsan, Malaysia.

Tel: 03-7805 5766 Fax: 03-7805 5866

E-mail: [novascientific@gmail.com](mailto:novascientific@gmail.com) Website: [www.novascientific.com.my](http://www.novascientific.com.my)