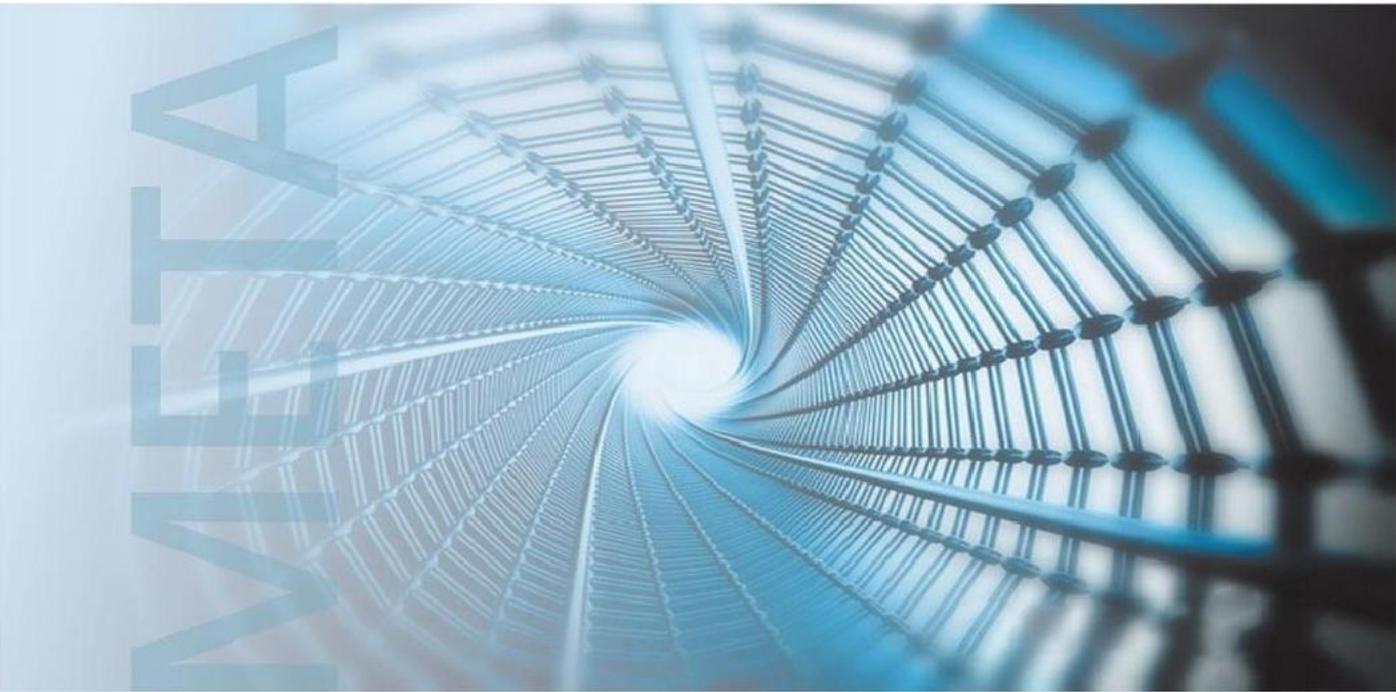


MetaLi



PRODUCT BROCHURES



Pioneer in Nanotech Enabled Manufacturing

www.metaliusa.com

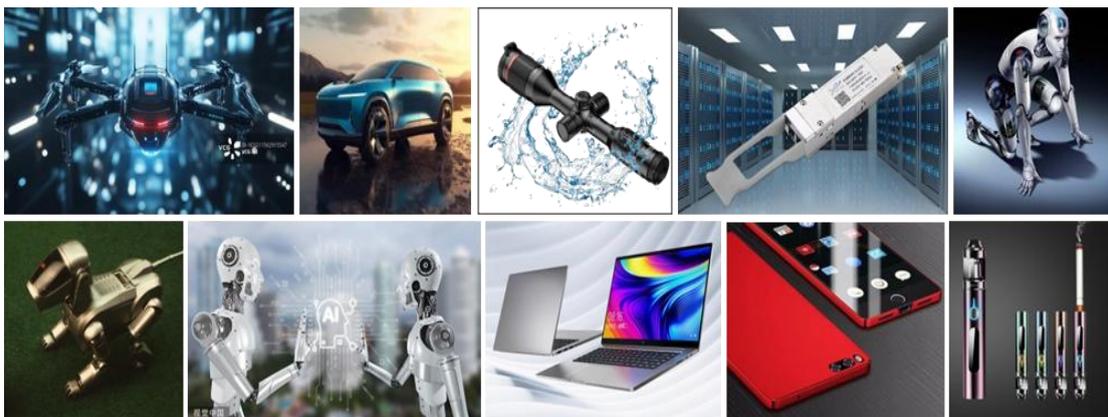
**CAST THE UNCASTABLE
WELD THE UNWELDABLE
PRINT THE UNPRINTABLE**

About Us

MetaLi LLC, a spin-off from UCLA, is a California-based high-tech company that develops and designs a new generation of high performance metals using Nanotech Metallurgy, which focuses on how nanophases can be engineered and applied to significantly improve the processing/manufacturing, micro/nano-structures, and physical /chemical/ mechanical behaviors of metals and alloys.

Technology

Emerging Nanotechnology-enabled metal manufacturing has become a revolutionary metallurgical platform in the new century. Such a platform connects with existing industrial processes and large-scale manufacturing, promoting the widespread use of nanotech-enhanced super metals with cost reduction and energy efficiency while leading a new metals revolution in the 21st century.



Nanotech-Enabled Die Casting of High Strength, Ductile, Highly Conductive, and Anodizable Parts of Wrought Aluminum Alloys (e.g. 6061/7075/2024)



Advantages by Casting

- Precision manufacturing complex parts by die casting for significant cost reduction
- Superior tensile strength, ductility, corrosion resistance and thermal stability
- Excellent thermal conductivity, above 140W/m·k to about 200W/m·K
- Die cast parts can be anodized for various colors
- Completely eliminate hot cracks and enable better die castability



High Pressure Die Cast (HPDC) Product Showcases

Nanotech-enabled die casting of high performance aluminum alloys, especially those traditionally difficult to die cast, offers unprecedented performance, including high strength, excellent ductility, high thermal and electrical conductivity, anodizable parts

◆ 7075NT (HPDC)



Infrared Lens Holder



Robot Motor Flange



Robot Swing Arm

Strongest aluminum alloys, the favored choice for humanoid robots, military devices, optical mount, and aerospace etc



Nano-treated super hard aerospace aluminum alloy can be die cast without hot cracking



After T6, 7075NT offers a yield strength of 470–500MPa, UTS of 520–550MPa and HV 175



Popular for aircraft structures and other structural components that require high strength and strong corrosion resistance, such as drones and humanoid robots.

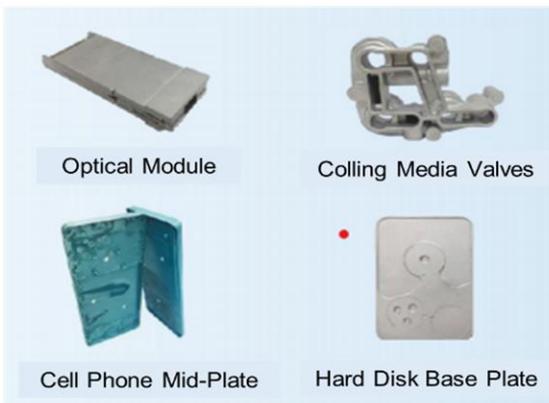
◆ 7005NT (HPDC)



High-strength tough aerospace aluminum is highly demanded by 3C consumer electronics

- ◆ Nano-treated wrought aluminum alloys offer superior fluidity, suitable for HPDC of strong and complex parts
- ◆ After T53, 7005NT offers a yield strength of 300MPa, UTS of 360MPa, elongation of 7% and HV 125
- ◆ Anodizable for colors after die casting
- ◆ Widely used in mobile phone frames, high-strength sports equipment, optical lens holders, drones, humanoid robots, and other fields.

◆ 6063NT (HPDC)



Enable the design of integrated complex, thin wall thermal management structures

- ◆ Best aluminum alloy in terms of thermal conductivity, second only to pure aluminum, with a thermal conductivity coefficient as high as 201 W/m · K
- ◆ 6063NT can be die cast into complex shapes while offering a yield strength of about 200MPa, UTS about 227MPa, elongation of about 6%, and HV80;
- ◆ Widely used in components with high thermal conductivity requirements, such as mobile phone mid-plates, automotive refrigerant valve islands, optical modules, and hard drives

◆ 6061NT (HPDC)



Empowering the design and manufacturing of low-cost high performance structural components

- ◆ Nano-treated 6061NT offers excellent castability, weldability and machinability
- ◆ Nano-treated 6061-T6 offers a yield strength of about 250MPa, UTS about 310MPa, elongation of about 8%, and HV120
- ◆ Widely used in high-strength structural components such as aerospace, military, electrical vehicle components, and E-Bike frames

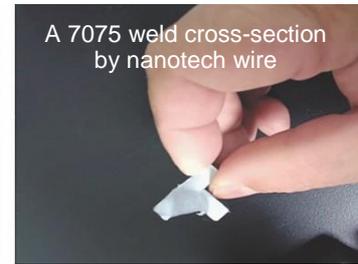
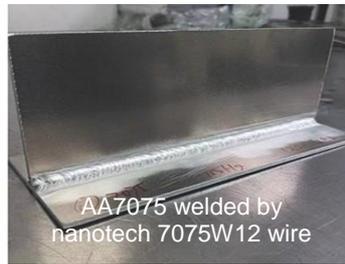
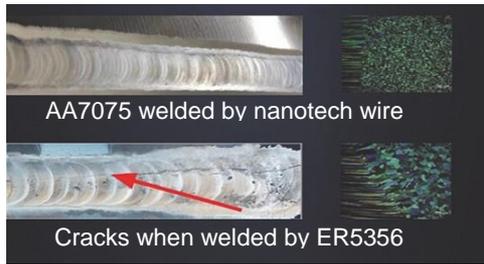


Properties of Wrought Aluminum Alloys by Nanotech Enabled Die Casting

Aluminum Alloys	Mechanical Properties			Hardness (HV)	Thermal Conductivity (W/mK)	Anodization Colors
	YS(MPa)	UTS(MPa)	Elongation(%)			
2024NT-Diecast	193-236	310-350	5.4 -10.0	110	110	All colors
2024NT-T6	310-350	455-485	6.2 -11.5	150	120	All colors
3003SNT-Diecast	102-124	165-201	8.4 -15.6	69	80	All colors
5083NT-Diecast	168-206	271-331	6.7 -12.4	97.5	80	All colors
6061NT-Diecast	109-133	198-242	15.4 -28.6	70	152	All colors
6061NT-T5	167-204	234-286	9.8 -18.2	95	142	All colors
6061NT-T6	245-285	289-341	7.6 -14.4	120	154	All colors
6063NT-Diecast	82-100	141-173	16-25	50	172	All colors
6063NT-T5	117-143	171-209	14.5 -19.5	65	179	All colors
6063NT-T6	179-219	204-250	4.0 -7.5	80	185	All colors
6013NT-Diecast	126-154	229-279	13.3 -24.7	85	140	All colors
6013NT-T6	326-398	380-440	4.2 -7.8	135	150	All colors
7005NT-Diecast	166-202	276-338	9.1 -16.9	90	120	All colors
7005NT-T53	250-300	300-360	4.9 -9.1	120	120	All colors
7005NT-T6	400-460	420-490	4.5 -8.5	150	120	All colors
7075NT-Diecast	215-262	315-385	4.0 -7.5	110	116	All colors
7075NT-T6	450-490	500-550	3-6.3	175	110	All colors



Nano-treated High Strength Aluminum Wires for Welding and Additive Manufacturing



- ✓ High quality welding and wire arc additive manufacturing of the previously unweldable materials (e.g. 7000 & 2000-series aluminum alloys)
- ✓ Completely eliminate hot cracking defects
- ✓ Exceptional grain refinement and modification
- ✓ Capable of joining dissimilar metals
- ✓ Improve weld quality and reduce demanding welding conditions
- ✓ Higher deposition rates achievable
- ✓ GTAW and GMAW process supported
- ✓ Supreme mechanical and metallurgical properties
- ✓ Fine grain structure achievable even though cyclic heat influenced by AM process

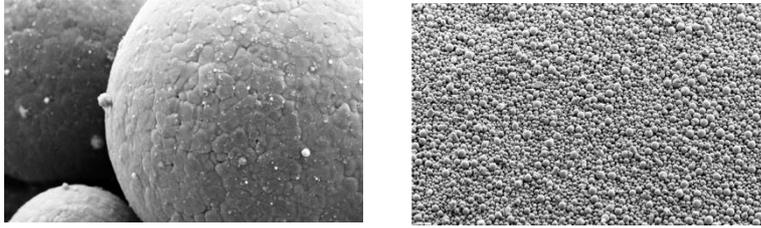


Butt Weld (TIG) Mechanical Properties

Material	Heat Treatment	YS (Mpa)	UTS (Mpa)	Elongation (%)
7075 NT	As weld	260	363	3
	T6	500	572	6
6061 NT	As weld	140	180	5
	T6	270	310	10
2024 NT	As weld	266	366	4
	T6	337	404	3.4
2319 NT	As weld	218	327	5
	T6	310	411	7.3



Metal Powders for 3D Printing and Powder Metallurgy (e.g. aluminum 7000, 6000, and 2000 series)



AA7075NT Powders for 3D Printing

- ✓ Ultra-high performance metal powders containing dispersed nanoparticles
- ✓ Significantly refined grain sizes throughout the printed parts
- ✓ Unprecedented strength and Young' s modulus as well as good ductility
- ✓ Unprecedented thermal stability
- ✓ Completely eliminates hot cracking defects
- ✓ Powders of aluminum, copper, steel, titanium and beyond

Mechanical Properties

Material	Heat Treatment	YS (Mpa)	UTS (Mpa)	Elongation (%)
6061 NT	As Printed	230	346	22
	T6	386	441	8
7075 NT	As Printed	542	624	8.7
	T6	724	788	5.4
2024NT	As Printed	376	485	14.7
	T4	442	549	12.8



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