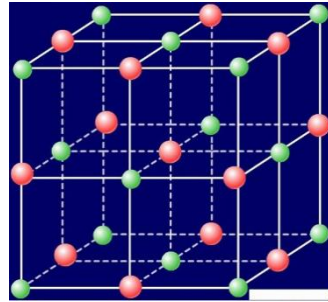


# Amorphous Metal

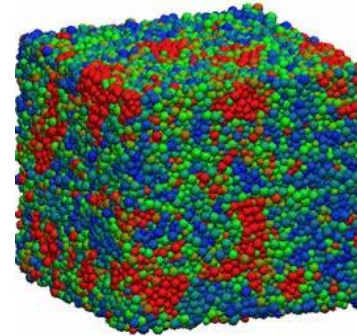
PMC Technologies Inc

# Amorphous metal structure

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Crystal structure



Amorphous structure

Amorphous metal, is a solid metallic material, usually an alloy, with disordered atomic-scale structure. Stronger than titanium, lighter than steel, durable like ceramics, not brittle.

Wear and tear resistant, Bacteria resistant, elastic properties

No hydrogen embrittlement, corrosion proof in sea water, acid and base resistant

# Larger available sizes - More applications

## Round shape

- D1 x 200mm
- D16 x 90mm
- D20 x 50mm
- D50 x 4mm

## Rectangular shape

- 1 x 15 x 180mm
- 15 x 15 x 90mm
- 50 x 50 x 2.5mm

## Amorphous metal properties – Mechanical

Property	Metric	English
Yield Strength	1600 MPa	232, 060 psi
Tensile Strength	1850 MPa	268 ksi
Young's Modulus	96 GPa	13, 923 ksi
Shear Modulus	34.3	4, 975 ksi
Flexural Strength	2000 MPa	290 ksi
Flexural Modulus	65 GPa	9, 428 ksi
Poisson's Ratio	0.36	0.36
Charpy Impact	6.5 J/cm <sup>2</sup>	31 ft lb/in <sup>2</sup>
Fracture Toughness	28 MPa. m <sup>1/2</sup>	25, 481 psi.in <sup>1/2</sup>
Fatigue Strength	300 MPa	43.5 ksi
Impact Strength	800J/m	15 ft-lb/in
Elasticity	1.8 %	1.8%

## Amorphous metal properties – Environmental, Biomedical

Property	Metric	English
Operating Temperature	200 °C max	392 °F max
Salt Spay Test	720 hours	720 hours
Seawater Immersion	No degradation for 30 days	No degradation for 30 days
Resistance to Acid	Yes	Yes
Resistance to Alkaline	Yes	Yes
Scratch resistance	Very good	Very Good
Ni release	Very small	Very small
Toxicity, Sensitization, Hemocompatibility	Pass	Pass
Mutagenicity, Pyrogenicity, Irritability	Pass	Pass

## Amorphous metal properties – Physical, Electrical, Thermal

Property	Metric	English
Density	6 g/cm <sup>3</sup>	3.47 oz/in <sup>3</sup>
Hardness	550 Vickers	52.5 Rockwell C
Composition	Zirconium	Zirconium
Electrical Resistivity	190 μΩ·cm	74 μΩ.in
Surface Roughness	0.05 μm	1.97 μin
Thermal Conductivity	5 W/m.K	2.9Btu/hr ft °F
Thermal Expansion	12 μm/m.K	6.7 μΩ (in/in) °F
Melting Point	836 °C	1536.8 °F
Glass Transition Temperature	425 °C	800 °F
Crystallization Temperature	500 °C	930 °F

## Amorphous metal properties - Physical, Electrical, Thermal

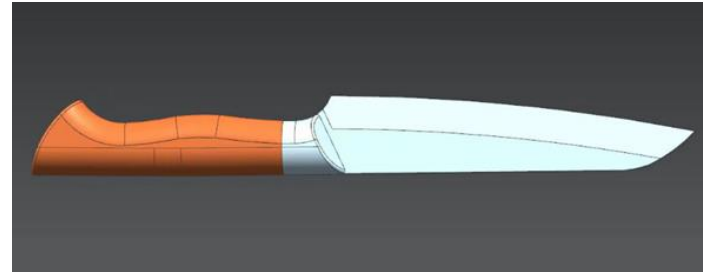
Property	Metric	English
Wall thickness	0.2mm to 20mm	0.0078 to 0.78 in
Flatness	0.05 mm	0.002 in
Tolerance	+/-0.015mm	+/-0.0006 in
Linearity	+/-0.03 to 0.05mm	+/-0.001 in
Coefficient of Thermal Expansion	$8.5 \cdot 10^{-6}/^{\circ}\text{C}$	$4.7 \cdot 10^{-6}/\text{F}$
Anti-galling without lubricant	Excellent	Excellent
Cryogenic environments	Excellent	Excellent
Biocompatibility	Excellent	Excellent
Wear and tear resistance	Excellent	Excellent

# Applications

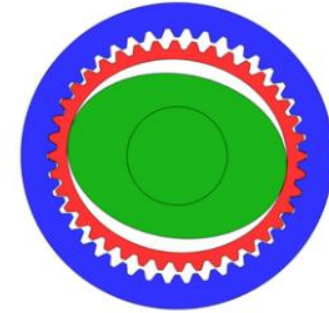
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**Watch case**  
**Scratch resistant**



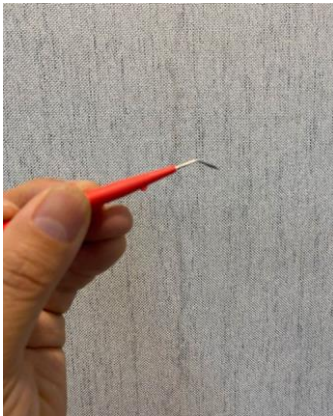
**Kitchen knife**  
**Sharp, high edge retention**



**Strain wave gear**  
**Flexspline**



# Applications



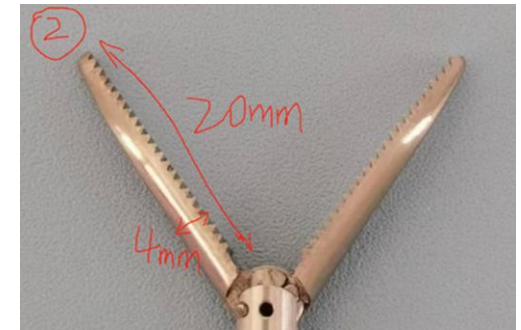
**Cornea surgical knife**  
Sharp, Biostatic



**Medical knife**



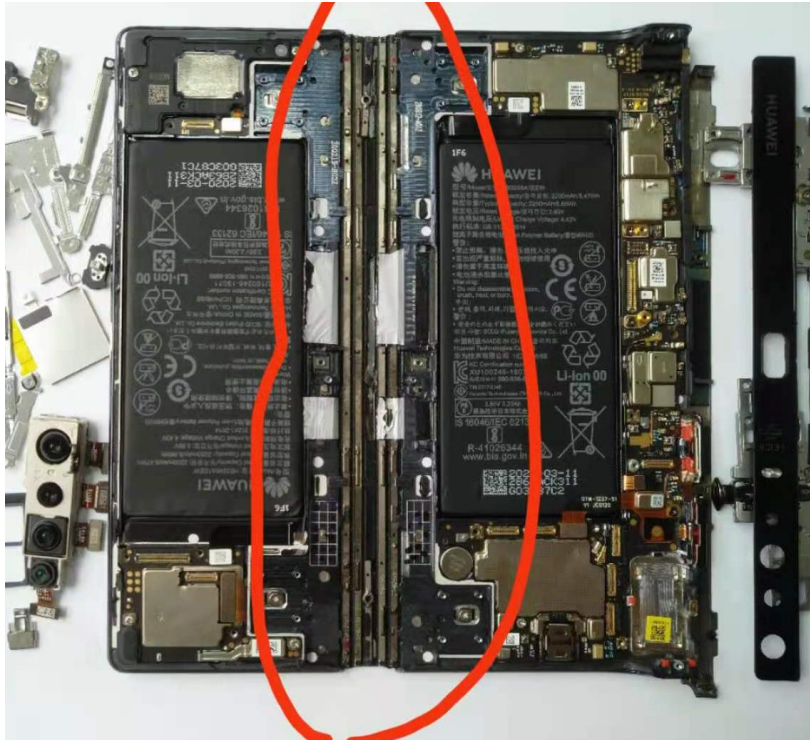
**Artificial joints**



**Surgical tool**

# Applications

Production cost lowered by 30%~40%



Folding cell phone hinge



Phone case and camera lens

# Others

SS 316



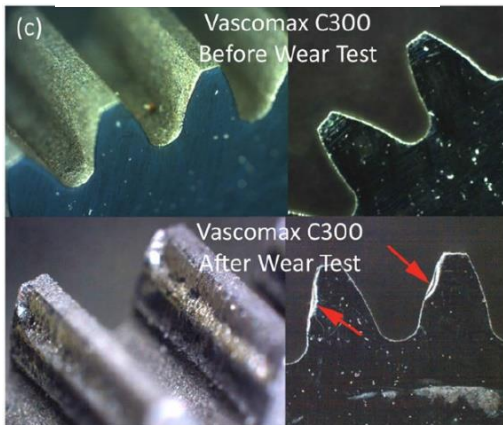
**Amorphous metal**



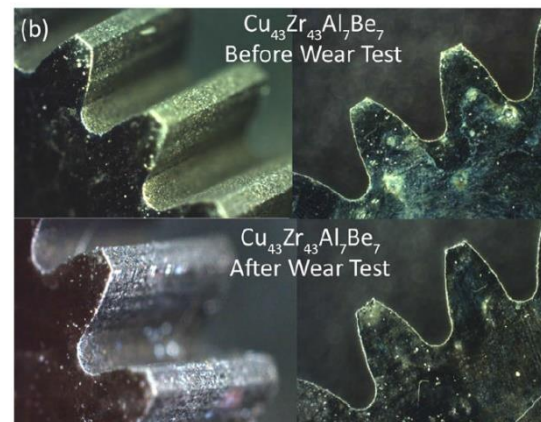
**Amorphous metal stored in room condition for 10 years  
No corrosion,  
No Hydrogen embrittlement**

20% HCl

*Vascomax C300*

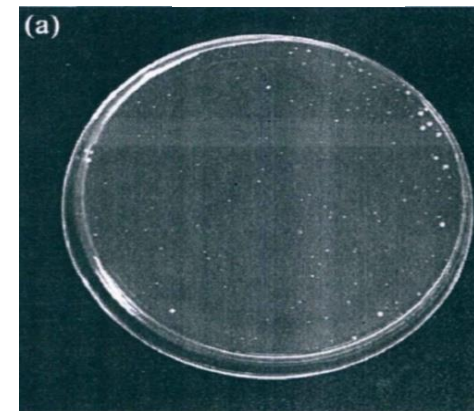


**Amorphous metal**

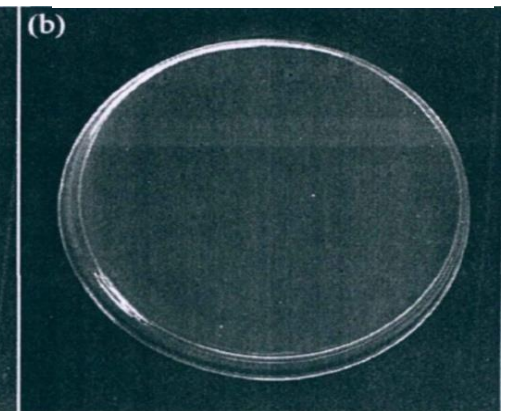


Wear test comparing to *Vascomax C300*

Titanium



**Amorphous metal**



Biostatic Properties