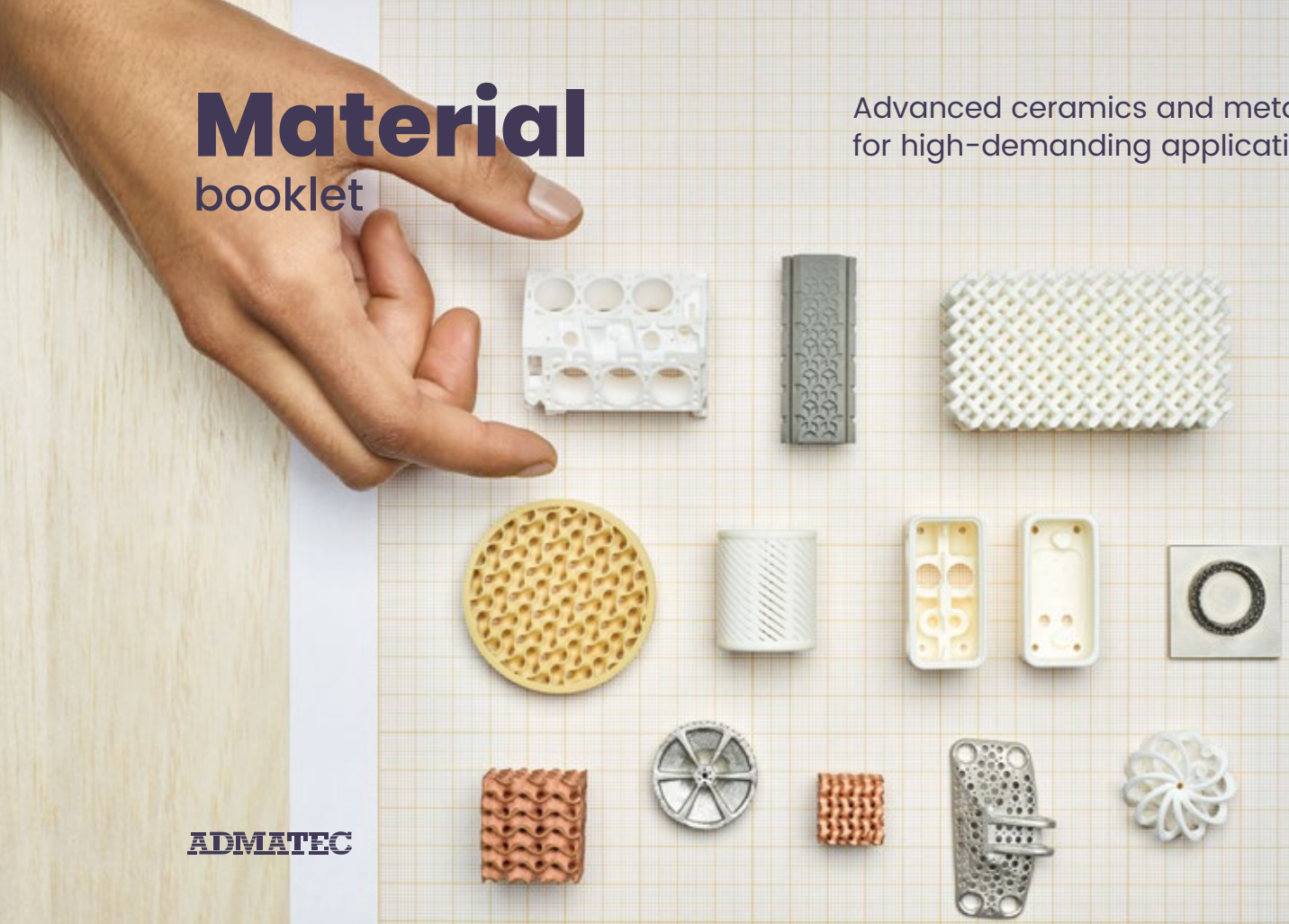
Material
booklet

Advanced ceramics and metals
for high-demanding applications



ADMATEC

The AdmaPrint Materials

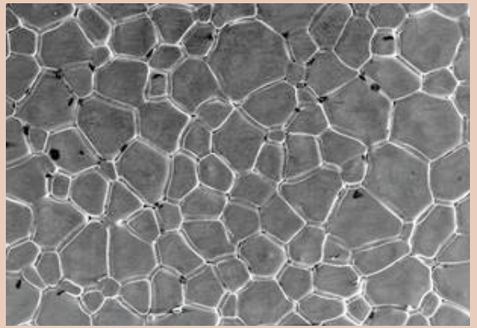
The AdmaPrint feedstock is specially formulated with a mixture of photosensitive resins and a solid load of powder (ceramic or metal), called slurry. The use of light curing and slurries allows achieving high resolutions and very fine surface roughness in printed products. Also, it prevents health hazards and (cross)contamination related to the use of dry powders. The AdmaPrint feedstocks can be used to print complex geometries, large and fine structures resulting in a wide variety of functional products.

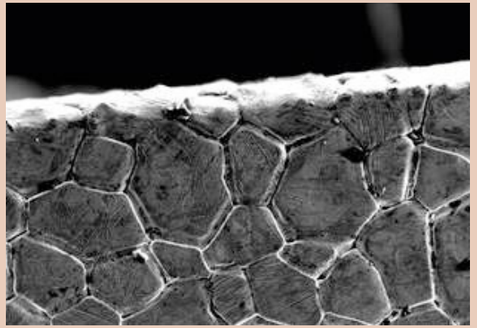
Why Digital Light Processing (DLP)?

Digital Light Processing, or DLP, is a printing technique known for its ability to print fine features with a high resolution and low surface roughness.

Compared with most other 3D printing techniques, where the part is heated up locally, the sintering at a uniform high temperature offers more isotropic properties and a more homogeneous microstructure.

DLP 3D printing with ceramics and metals offer high-performance materials with densities of more than 99%. The SEM pictures show the good shape retention, straight corners and regular microstructure of the sintered parts. In most cases, postprocessing is not needed, as the surface finish is very smooth.



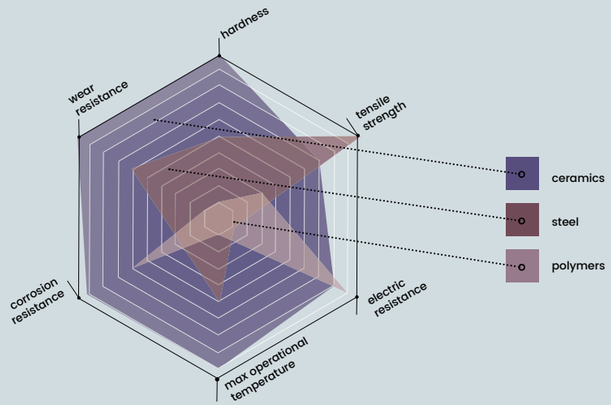


Sintered 316L printed on the Admaflex 130

The unique capabilities of advanced technical ceramics

Advanced ceramics combine high-performance properties for demanding applications. Ceramics are hard inorganic, non-metallic materials with an impressive capability to hold their excellent mechanical, chemical, electrical properties and thermal wear resistances under extreme environments.

Ceramics vs. Steel vs. Polymers



ceramics MATERIAL COLLECTION

Alumina - Al_2O_3

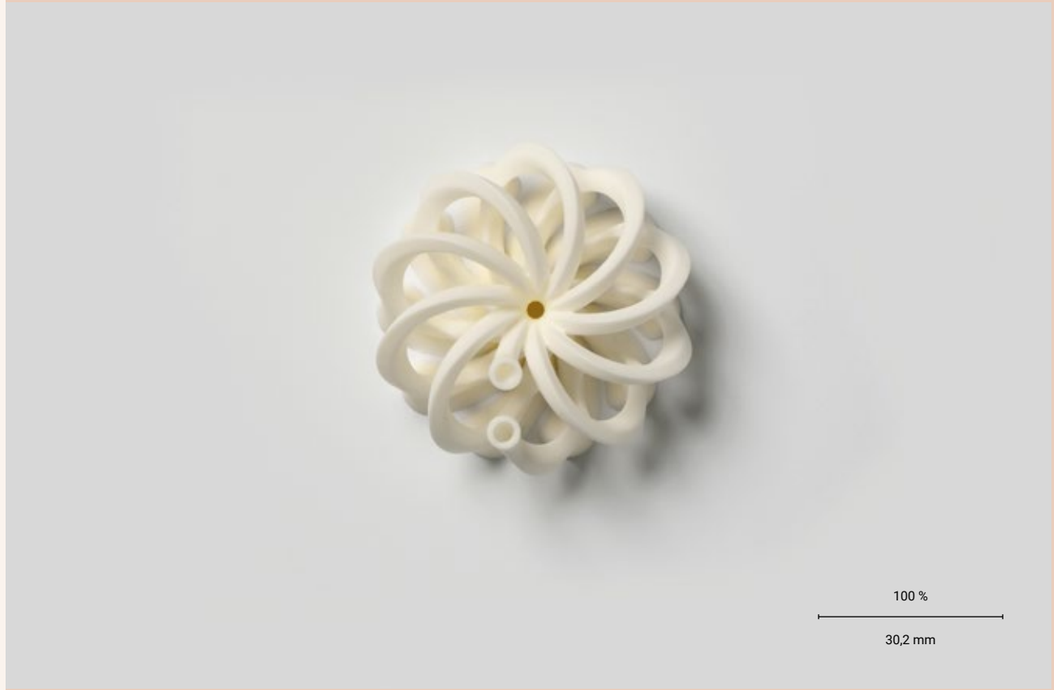
Alumina (Al_2O_3) is one of the most commonly used ceramics in high-tech applications because of its wear resistance and its high chemical and temperature stability. Alumina finds applications in water purification, insulators, semiconductor components, and medical implants. The AdmaPrint A130, Admatec's alumina recipe, delivers components with high density (> 99%) and smooth surfaces (Ra = 0.3-3 µm).

PROPERTIES

High hardness
High electrical resistance
Refractoriness

APPLICATIONS

Semiconductors and electronics
Medical implants
Valves and pumps



Zirconia - ZrO_2

With superior mechanical properties, zirconia (ZrO_2) presents high flexural strength and fracture resistance. Also, zirconia shows very low thermal conductivity, high chemical inertness, and biocompatibility. Among the applications of zirconia, we can find dental restorations, thermal barrier coatings, and jewelry. The AdmaPrint Z130, Admatec's zirconia recipe, delivers mechanically strong products with high definition.

PROPERTIES

Low thermal conductivity
High electrical resistance
High toughness

APPLICATIONS

Extrusion dies
Bearings
Jewelry

Silica - SiO_2

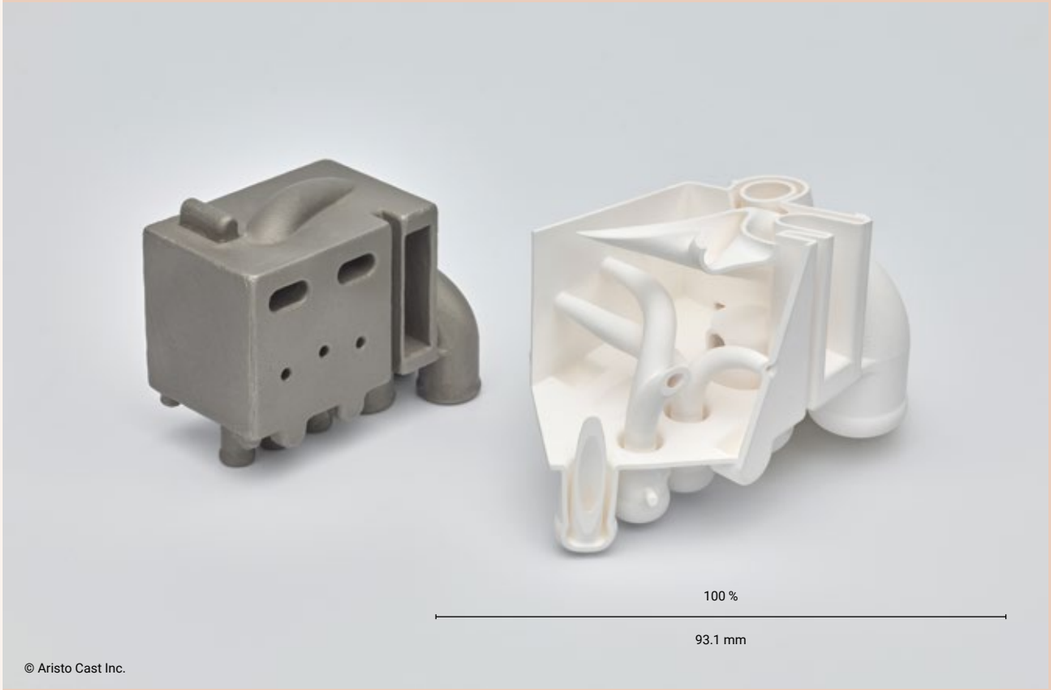
Silica (SiO_2) is well known for its thermal shock resistance and leachability (chemical dissolution). For these reasons, it is commonly used for the production of shells and cores in investment casting for aerospace and energy applications. The AdmaPrint S130, Admatec's silica-based recipe, delivers mechanically strong shells with excellent surface properties.

PROPERTIES

High thermal shock resistance
Chemical and mechanical leachability

APPLICATIONS

High precision casting
Refractories



Hydroxyapatite

Hydroxyapatite is a naturally occurring mineral, the main element of bones and teeth. Hydroxyapatite is very well-suited to use as a precursor in biomedical applications such as bone replacement and dental implants. Additive manufacturing brings the form freedom capabilities that allow the personalization of medical implants. Admatec produces the AdmaPrint B130 feedstocks that can generate porous yet strong products necessary in implantology.

PROPERTIES

Biocompatible

APPLICATIONS

Bone grafting
Dental prosthetics and repair

metal MATERIAL COLLECTION

Stainless Steel 316L

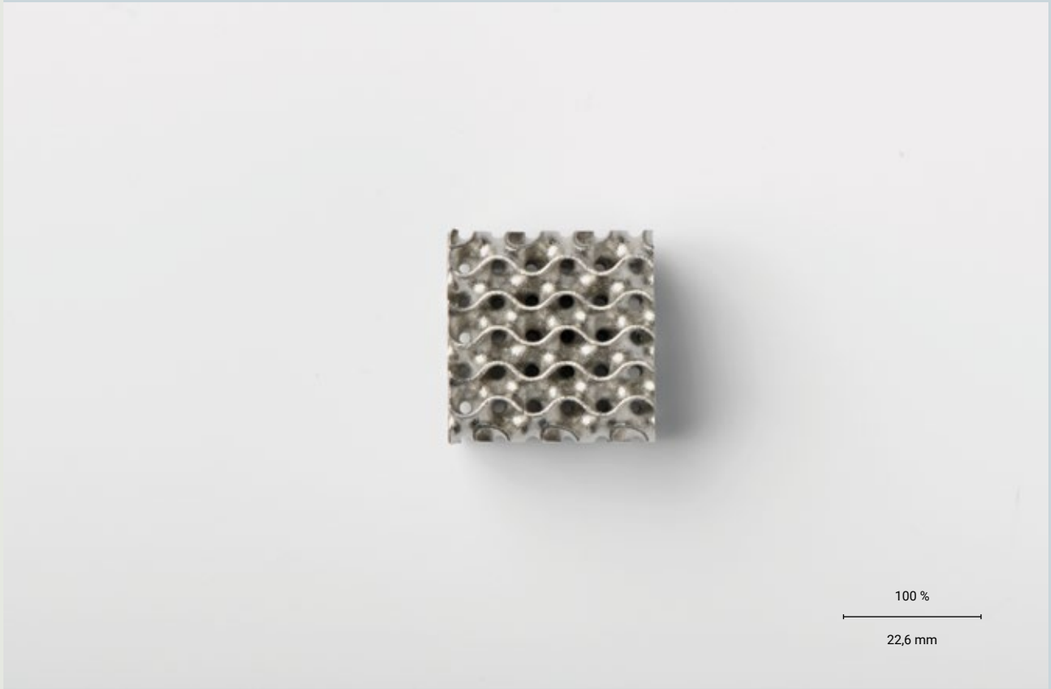
Alloy 316L is molybdenum-bearing austenitic stainless steel, allowing for good overall resistance to corrosion. 316L is known for its outstanding formability and weldability and offers long-lasting high quality with outstanding elevated temperature tensile. It is robust towards environmental influences, immune for sensitization and a tough material used for weight-bearing duties. Applications typical for 316L are for use in construction and marine projects.

PROPERTIES

High corrosion resistance
High toughness
Non-magnetizable

APPLICATIONS

Watches, decorative parts
Medical devices
Food processing equipment



Stainless Steel 316L

Stainless Steel 17-4 PH

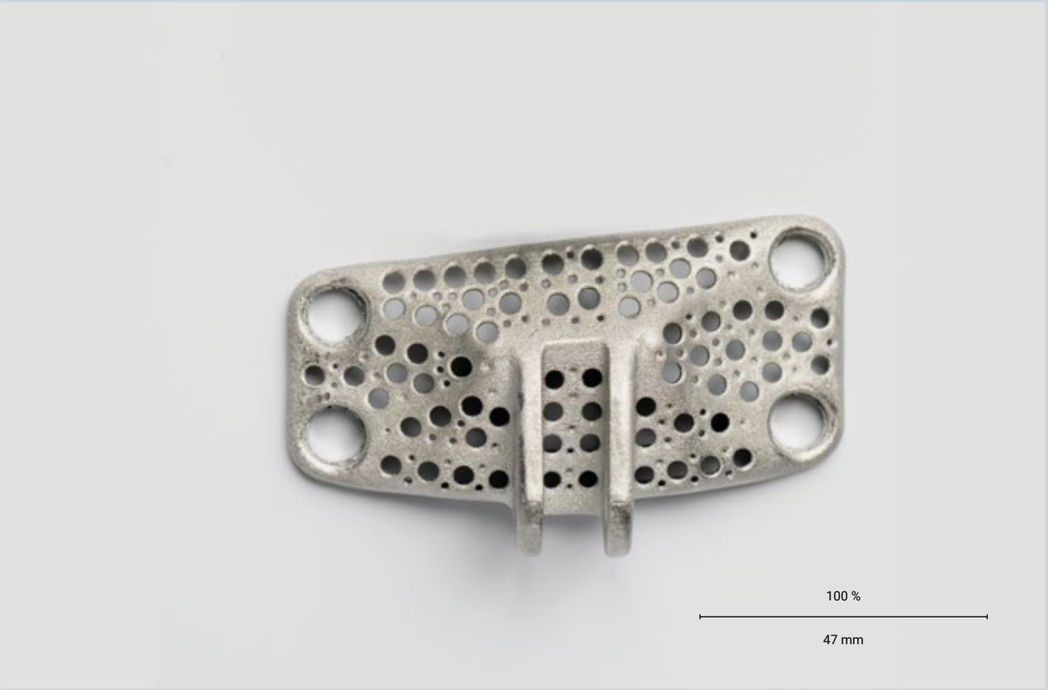
17-4 PH is a martensitic precipitation-hardening stainless steel providing an excellent combination of high strength, good corrosion resistance, and fine mechanical properties at temperatures up to 315°C. Of all the precipitation-hardening stainless steels, 17-4 PH is the most widely used, as a result of its valuable combination of properties. These properties provide the opportunity to add reliability while reducing costs and simplifying fabrication; an effective solution to many design and production problems. Applications for this metal can be found in aerospace and chemical equipment.

PROPERTIES

High strength
High hardness
Excellent corrosion resistance

APPLICATIONS

Mechanical engineering
Automotive
Aviation and maritime



Inconel 625

Inconel 625 is well-known for its versatile properties. The alloy mixture of nickel, chromium, and molybdenum makes it a very strong material, and resistant to elevated temperatures. Inconel 625's properties, such as high corrosion fatigue strength, high tensile strength, and resistance to chloride-ion stress-corrosion cracking, making it an outstanding choice for sea-water applications. Broad acceptance can also be found in chemical processing as this alloy has a versatile corrosion resistance under a wide range of temperatures and pressures.

PROPERTIES

High strength
High oxidation resistance
High resistance to severely corrosive environments

APPLICATIONS

Aerospace
Automotive

Inconel 625

Copper

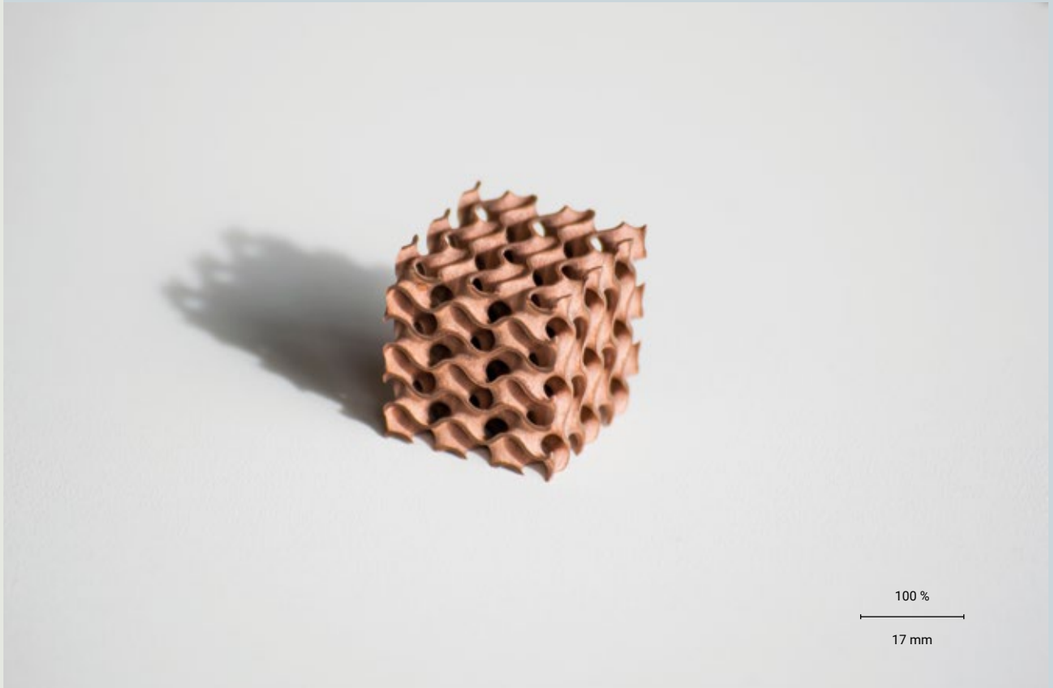
Copper is a soft, extremely ductile metal with a very high electrical and thermal conductivity. It is resistant to corrosion and has low chemical reactivity. Copper nowadays is essential for a variety of domestic, industrial and high-tech applications.

PROPERTIES

High thermal conductivity
Corrosion resistance in humid environments and sea-water
High electrical conductivity

APPLICATIONS

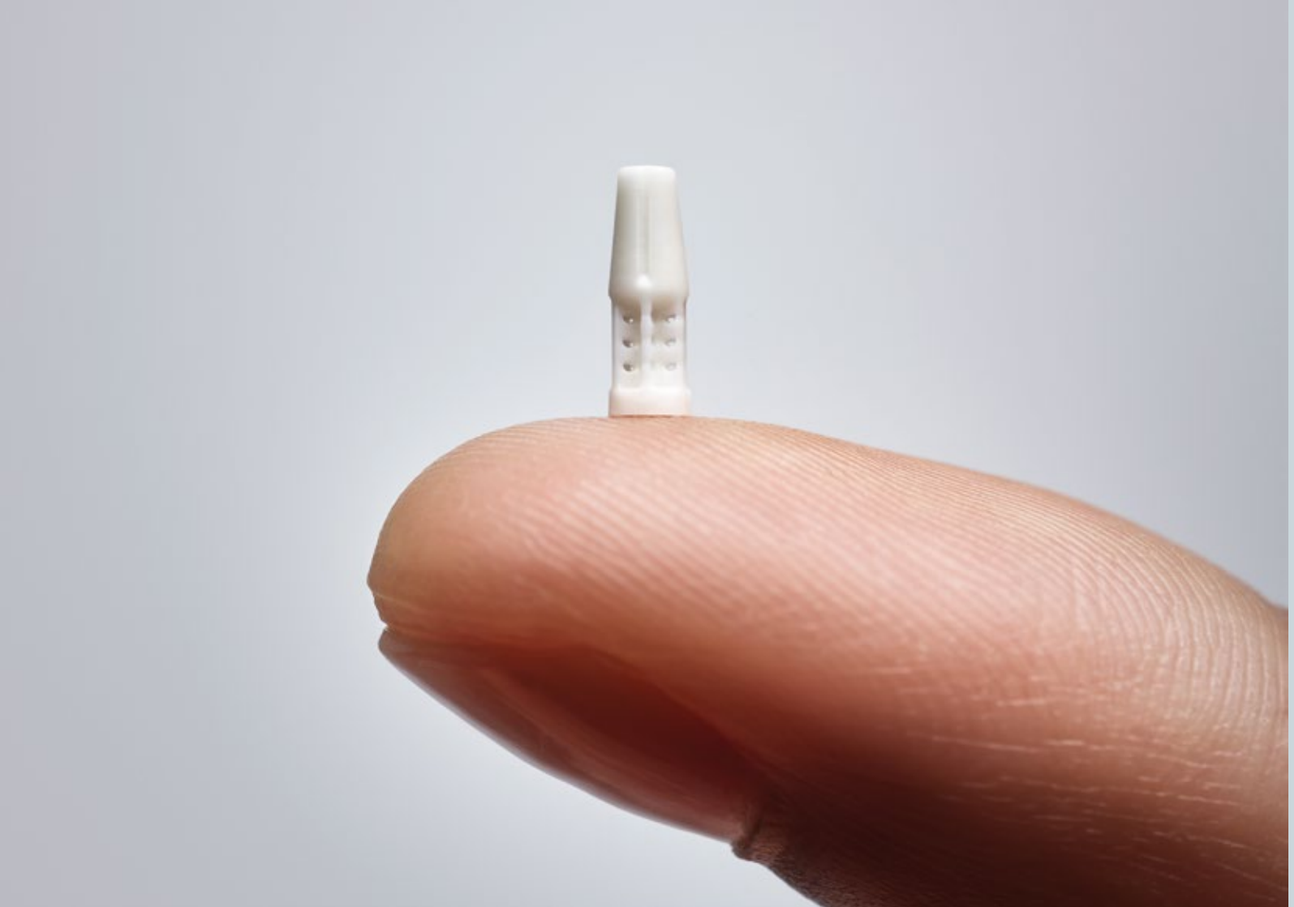
Heat transfer applications
Induction heat coils
Radiofrequency Cathode



TECHNICAL DATASHEET

	AL_2O_3	ZRO_2	316L	17-4 PH	INCONEL	COPPER
Density (g/cm3)	3.9	6.06	8.04	7.81	8.4	8.75
Young's modulus (GPa)	360	210	190	190	205	130
Bending strength (MPa)	400	600-1000	510	1100	1100	200
Fracture toughness (MPa.m1/2)	3.5	6-9	-	-	-	-
Vickers hardness (HV)	1600 (HV30)	1200(HV30)	120 (HV10)	370 (HV10)	145-220(HV10)	100(HV10)
Thermal conductivity W/mK	30	2-3	15.9	14	10	360
Thermal Expansion coefficient 10-6/K	7-8	10	17	10.8	12.8	13
Electrical resistance Ω/m	1012	108	-	-	-	-

Note: The stated values are typical to this type of material, and may vary due to sintering conditions. This is non-contractual data to be used only for reference.



ADMATEC

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