



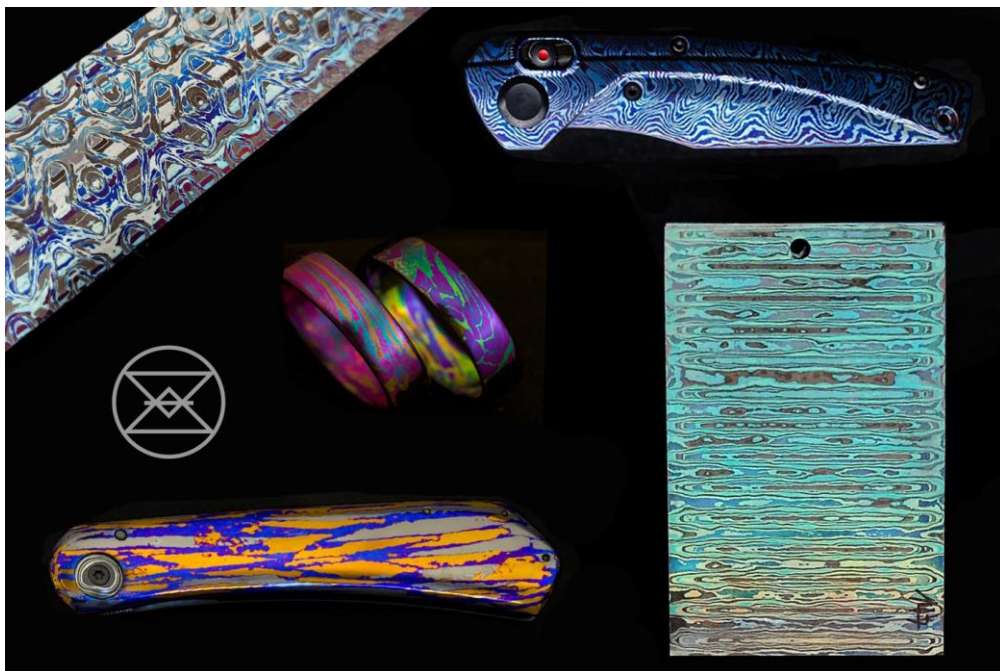
FUTURON FORGE

Datasheet

Rainbow Futuron

Titanium – Zirconium – Niobium composites

#BlackFuturon #FFMoku-Ti #FFNiobiumTi



Our Titanium, Zirconium, or Niobium composites production process is a highly controlled process, made under high pressure in a protective atmosphere. The resulting product is a homogeneous composite that you can use for various applications in knifemaking, watchmaking, or jewelry applications. Main properties of our non-ferrous composites:

Corrosion resistance - Our composites are highly corrosion resistant even when they are in prolong contact with human skin or exposed to the most commonly available acids.

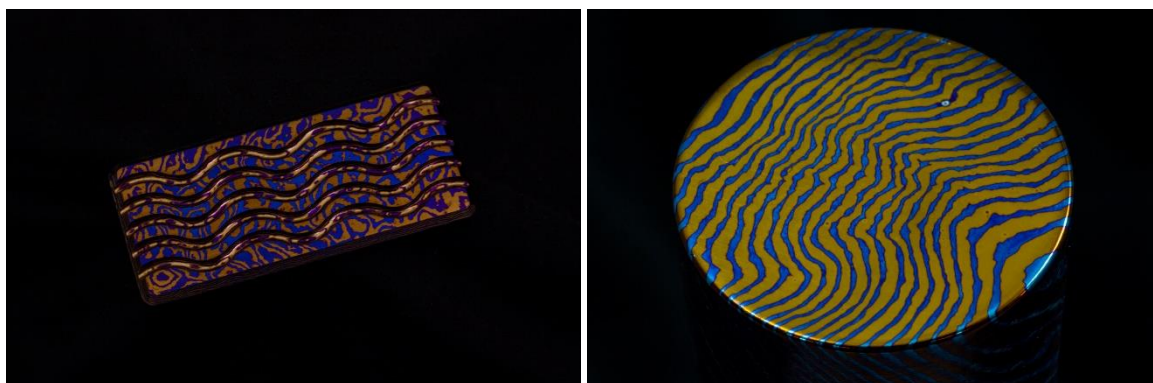
Hypoallergenic - Due to their composition, our materials are fully hypoallergenic, you can wear on various places of the human body without risk of skin irritation.

Low weight – an important issue, especially for a long time wearable stuff. Titanium composites reach at least one-half of a steel weight ($\rho = 4,5 \text{ g/cm}^3$) even in composition with Zirconium, we get low-weight ($\rho = 4,99 \text{ g/cm}^3$).

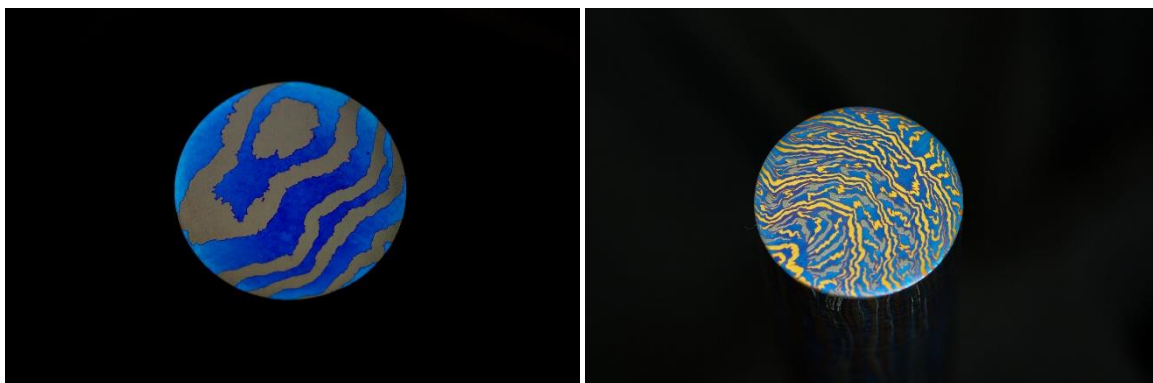
Colors - our composites are rich in color composition you can reach by heat or electro-chemical oxidation. This gives you a chance for many color combinations; however black and white is also possible when Titanium-Zirconium composite is used.



Moku-Ti - #CompositeFuturon - composite of various titanium grades (mainly Gr2, Gr5, Gr7, Gr9). The resulting composite is lightweight ($\rho = 4,5 \text{ g/cm}^3$). #CompositeFuturon has perfect mechanical properties, and it's rich in color combinations. You can reach different colors by electro-chemical or heat oxidation. Each piece of produced material can be colored differently depending on possible anodizing color-spectrum. Material is fully hypoallergenic. It's suitable for knifemaking, jewelry applications, or watchmaking. We make this material in various shapes, mainly flat bars, rods, or bolster mosaics.

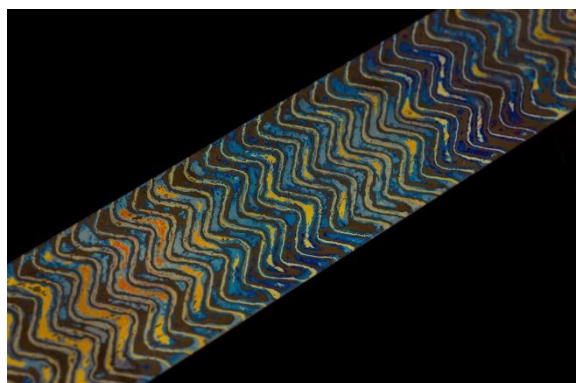
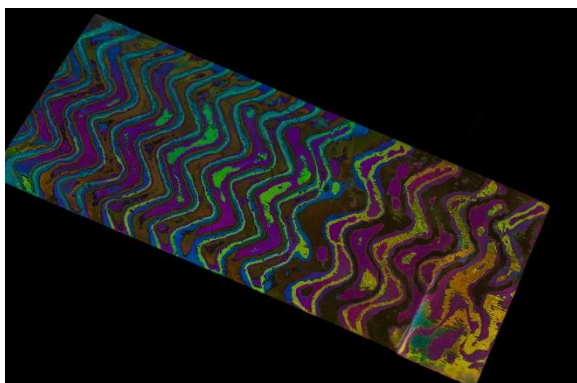


Zircu-Ti - #BlackFuturon – a composite of Zirconium and various Titanium grades (mainly Gr2, Gr5, Gr7, Gr9). Zirconium (Zr) is an extremely corrosion-resistant metal. When heated, it takes black oil color. Depending on percentage of Zirc in composition, the material a bit heavier than full-Titanium damascus ($\rho = 4,99 \text{ g/cm}^3$). You can reach different colors by electro-chemical or heat oxidation. Each piece of produced material can be colored differently depending on the possible anodizing color spectrum. Material is hypoallergenic. It's suitable for knifemaking, jewelry applications, or watchmaking. We make this material in various shapes, mainly flat bars, rods, or bolster mosaics.





Niobium-Ti - #NiobiumFuturon – Composite of Niobium (Nb) and Titanium (Ti) sometimes mixed also with Zirconium (Zr). Niobium is marked as a rare element, used for its properties in medicine, rocket engines, superalloys, etc. Created composite is exceptionally corrosion-resistant, suitable for full contact with human skin. When electro-chemical or heat anodized, it makes a palette of vivid color. Allows a lot of coloring variations.



Technical information

Composition

Chemical composition of our mainly used non-ferrous materials

Aloy	Ti	Al	V	Mo	Zr	Ni	Nb	Hf
Titan GR1	99							
Titan GR2	99							
Titan GR5	90	5,5-6,75	3,5-4,5					
Titan GR9	94	2,5-3,5	2-3					
Titan GR12	98			0,2-0,4		0,6-0,9		
Titan Tivt	85-91	5,5-7	0,8-2,5	0,5-2	1,5-2,5			
Zirkonium					94,7			4,5
Niobium							99	

Machining conditions

For proper machining of our composites, it is good to have some skill in machining Titanium. In composition with Zirconium or Niobium, machining is a bit more complicated than with Titanium



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composite. We recommend making a sample piece and finding the machining conditions matching their equipment for unskilled users. Our recommended machining conditions below:

- Milling – monolithic carbide mill --- Vc40 m/min
- For hard-milling (sizing) with monolithic carbide, mill feed up to Vc60 m/min
- Milling with VBD mill --- Vc40 m/min
- Lathing with VBD mill --- Vc40 m/min
- Milling with HSS-Co mill --- Vc10 m/min
- Drilling - HSS-Co drill --- Vc6-8 m/min
- Drilling – PVD coated carbide drill ---Vc27-45 m/min

Grinding

Our steel can be ground on all conventional types of grinders. We recommend belt-grinders or Berger grinding machines. We recommend sanding belts with ceramic grains for belt grinders, like 3M Cubitron II. However, all conventional abrasives are usable (for example, SAIT, Klingspor, Norton, VSM, etc.). Always use „fresh“ sharp grinding belts – avoiding of creation of burned surface „crust“, which can make problems when coloring.

Polishing

You can get slightly different color results when your product is shiny polished or dimmed. For polishing, we recommend blue Unipol paste. For dimming, we use excellent ScotchBrite belts or pads.

Coloring

You can reach different colors by using heat oxidation (mainly by gas torch), electro-chemical oxidation (using DC electrical source) or combination. We recommend making some testing samples for unskilled users before you start to color your final product.

The Basic color palette you can get on Titanium

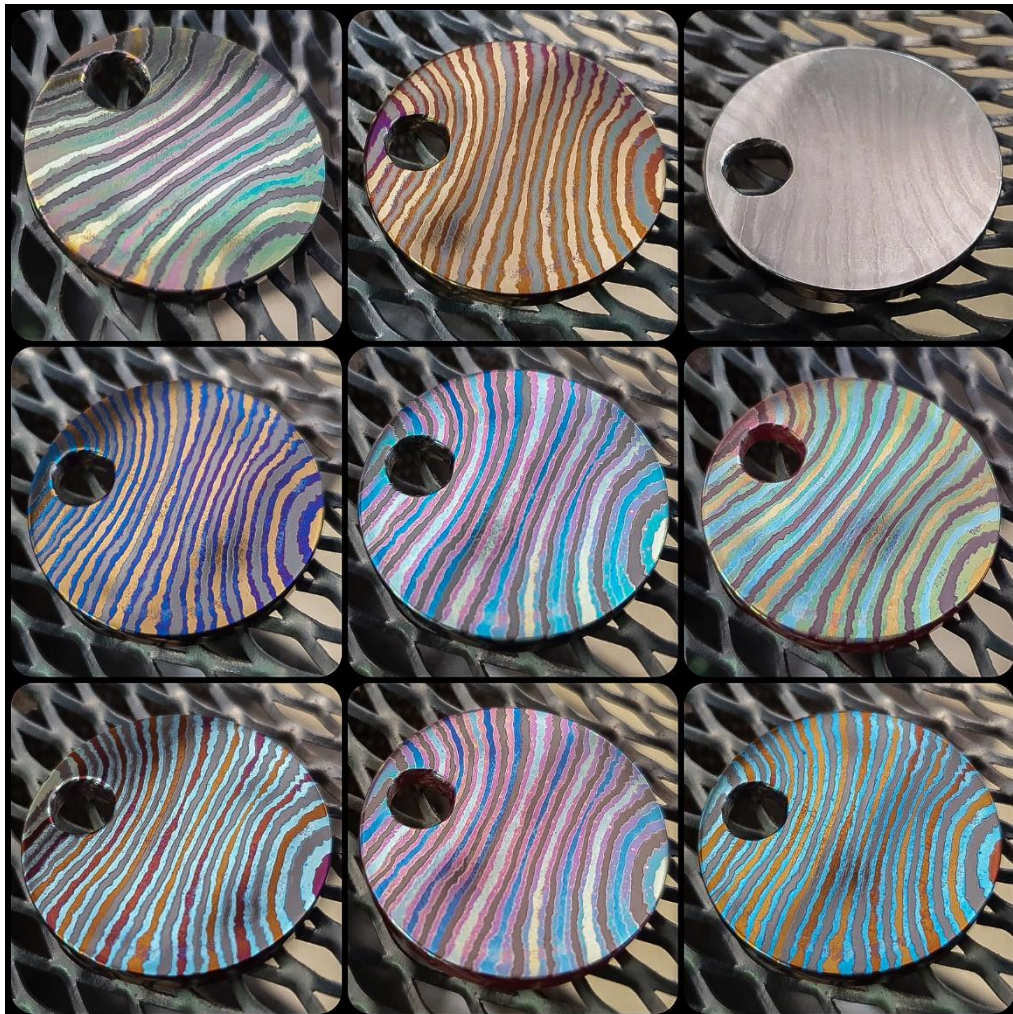




Heat oxidation

It is the easiest way to get your composite colors. We recommend using propane butane gas torch and slowly heating the product starting to reach the first colors. Stop heating when you've reached your estimated combinations and let the product slowly cool down. You can reach the first color about 430°C up to 850°C.

Check the color combinations on a piece of Zircu-Ti below.



Hint: Reaching a dark-black color on Zirconium composite you must heat it up to titanium's purple. When you need a blue-black combination, you have to polish, dimm, or etch a purple color from Titanium (black Zirconium will stand still). Now you have a silver-black variety, and you can make the heat oxidation again (blue is one of the first colors).



Electro-chemical oxidation

You can color our material also by using a DC electric source. For reaching a full spectrum of colors, you need DC 0-120V. As an electrolyte, use the following solution: 1 litre of distilled water + 5 grams of Trisodium phosphate (Na_3PO_4) known as TSP. Instead of TSP you can use 10 grams of baking soda; however, you'll reach better color results with TSP. Like a cathode, use a piece of Titanium sheet. To dive a product into an electrolyte, use a Titanium or Niobium wire, avoid contact with steel (on a crocodile clip).

- The resulting color combination is different than when you use heat oxidation
- For better color results, use TitanEtch or Multietch as a primer.
- You can use heat oxidation after electro-chemical oxidation – this will bring you new color combinations and deeper colors.
- Using TitanEtch or Multietch, you can remove anodized colors and make other color combinations, especially with black Zirconium.
- Make testing samples before coloring your final product, especially when combining heat and electro-chemical oxidation with the above-mentioned etchants.

Product marking

Zirconium composite	Marking: FF Zircu-Ti Hashtags: #RainbowFuturon #BlackFuturon #FFZircuTi
Titanium composite	Marking: FF Moku-Ti Hashtags: #RainbowFuturon #FFMokuTi
Niobium composite	Marking: FF Niobium-Ti Hashtags: #RainbowFuturon #FFNiobiumTi

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