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PROMETHEUS®
BRONZE CLAYS

Ocean Majesty by Carrie Story

The first torch-fireable bronze clay!

- Low Firing Temperatures
- Minimal Shrinkage
- Pre-mixed Clay
- Available in Syringe

BRONZE

WHITE BRONZE

BRONZE SYRINGE

WHITE BRONZE SYRINGE

Welcome to Prometheus®!

Prometheus® clays are an amazing medium that allows you to take virtually any design and turn it into pure metal art. These gorgeous bronze and white bronze clays are perfect for nearly any jewelry or fine art object, as they are able to be worked by hand with even the most simple of tools.

The Bronze Background

Bronze is arguably the most important metal in human history, forever changing each and every culture that encountered it. Bronze has been used to make nearly any and every tool, weaponry, armor, building materials, musical instruments, and—of course—art.

The first bronze was made with a combination of copper and arsenic; early bronze workers were prized for their skills, but tragically had very short lives. The combination of bronze and tin was not used until the 3rd millennium BCE, its development likely driven by the high death rate of working with arsenic-based bronze. What makes bronze so unique amongst early metal works is that its ingredients are never found together, meaning cultures must have had to interact and trade to obtain the resources to create their bronze items.

As the use of bronze spread worldwide, various countries and peoples developed new ways of incorporating the metal into their daily lives. In China, bronze was the metal of choice for knives and other personal use utensils. In Egypt, bronze was used for fittings and ornaments on chariots. Because bronze is extremely resistant to corrosion, ancient Greeks and Romans used it as they built their ships. By 2500BCE, bronze casting techniques had advanced to where we start to see large sculptures and life-sized bronze replicas of true-to-life forms.

Though the Bronze Age officially ended around 700BCE, various bronze alloys are still used commonly today. Aluminum bronze is extremely hard, and thus used in springs, bushings, bearings, and in small motors. In environments with high fire risk, bronze tools are preferred because they do not generate sparks against hard or other metal surfaces. Phosphor bronze is the metal of choice for ships' propellers, as it is both strong and nearly corrosion-proof. Bronze remains the material most frequently used for making bells, cymbals, and the windings of most string instruments.

As a jewelry metal, bronze is the ultimate material; it is inexpensive but beautiful, simple to work with but difficult to destroy. Bronze metal clays come in a wide variety of consistencies and colors.

Prometheus® bronze is available in bronze and white bronze. The golden bronze color is torch-fireable, making this metal clay unique and very attractive to the metal clay community.

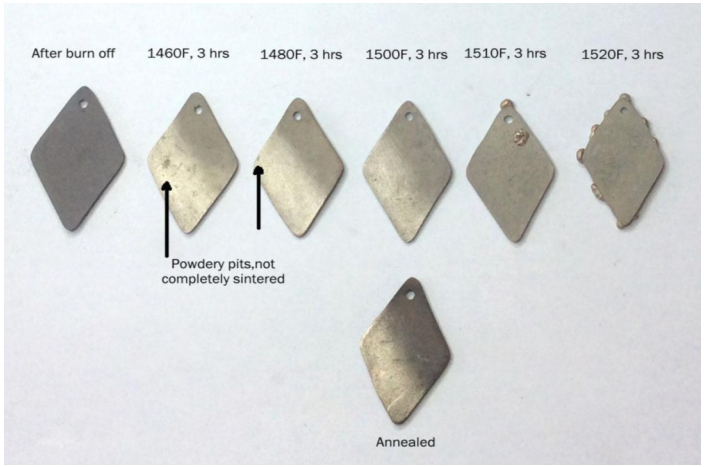
Because of the small firing temperature range of Prometheus White Bronze, **it is highly recommended that you complete a full firing test** before firing intricate pieces. The following procedure will lead you to the correct temperature and hold time combination for your specific setup.

Phase 1: Burning out Binder

- Make 10 identical pieces, 4 cards (1mm) thick and no larger than a quarter in size. Dry/refine.
- Program kiln to ramp full speed to 932°F and hold 10 minutes. Put the pieces on steel mesh.
- When kiln reaches 900°F, place the pieces in the kiln. Fire for 10 minutes at 932°F. Remove.

Phase 2: Testing for Sintering

- Place the first (1) piece in the center of the firing pan filled with carbon, and place the firing pan in the center of the kiln. Fire full speed to 1420°F, hold for 3 hours.
- When the carbon is cool, brush half of the piece with a steel brush. If the piece is powdery, it is not sintered fully. Keep track of this piece and its firing temperature.
- Place the 2nd piece in the kiln as before, this time firing to 1440°F; hold 3 hours.
- Again, when carbon is cool, brush half of the piece with a steel brush. Look for signs of sintering; if any areas are powdery, sintering is not complete.
- Repeat firing with test pieces, increasing temperature by 20°F each time until the test piece shows signs of little balls or bubbling. This indicates a temp that is too high, and this is the final test piece. Don't bother brushing the test piece with the bubbles.
- Fire one more piece 10°F cooler than the temp that caused bubbling, to see if the piece will still melt. Your goal sintering temperature is the highest temperature that does not cause any balling or bubbling, but does not have any powdery spots. (In the sample shown, the ideal sintering temperature is the 1500°F for 3 hours.)
- Fire one more piece at the ideal temp, then anneal the piece by firing on steel mesh in a pre-heated kiln, 1050°F for 5 minutes. Quench the piece immediately, and brush with a steel brush.



Finishing Prometheus® Projects

Once fired, the piece is a solid piece of metal. As with other fired metals, it can be sawn, drilled, sanded, or soldered using traditional jewelry tools and materials. Keep in mind that many finishing techniques will be easier to perform at the dried, pre-fired stage. Should the piece come from the kiln warped or curved, it can be reshaped gently with a rawhide or rubber mallet. Likewise, textures and shaping can be added post-firing.

To bring out the clay's true metallic color and finish, brush well under running water. Use a brass brush on bronze, and a stainless steel brush on white bronze. For a very shiny finish, tumble the piece for at least two hours with stainless steel shot or shine specific areas with an agate or stainless steel burnisher. A flex-shaft is a wonderful tool for finishing, as the various tips and ends have different and specific effects on the metals.

Mini-PicklePot
ACW #F-222

Prometheus Bronze fired in carbon will be a traditional yellow-bronze color, but bronze fired open shelf or with a torch will be more pink, nearly copper-colored. To bring out more of the yellowish color and tame the pink, use a solution of 50% pickling agent to 50% hydrogen peroxide and pickle the piece until the color best matches your goal tone.

Firing Prometheus® Clays

Prometheus® Bronze

Prometheus® Bronze can be fired with a butane torch, in a kiln on an open shelf, or in a kiln submerged in carbon. The style of firing you choose with determine the color of the clay post-firing, as well as the specific shrinkage rate.

Torch Firing is recommended for pieces no larger than a quarter and no thicker than 1/4 inch.

- Place the piece on a steel mesh on top of a firing brick.
- Turn the lights low in order to better see the metal color while firing
- Bring the piece to a cherry red glow and hold for at least 7 minutes, 10 minutes for pieces thicker than 1mm.
- Quench the piece in cool water immediately, if possible keeping the flame on the piece until the piece is in the water

ACW #BT-02

* Signs that sintering is complete include the piece laying flat on the firing surface, and small visible pinpoints of bright orange inside the piece

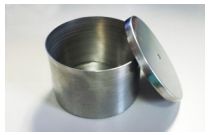
Kiln Firing is recommended for pieces thicker than 1/4 inch and larger than a quarter.

Open Shelf Firing: (Place the piece(s) on steel mesh, not on firing board or blanket!)

- Pre-ramp the kiln to 1508°F/820°C. Once the kiln is at temperature, put the pieces into the hot kiln
- Once the kiln has returned to 1508°F/820°C, hold for 30 minutes, then quench immediately

Carbon Firing:

- Pre-ramp the kiln to 932°F/500°C. Once the kiln is at temperature, place the pieces into the hot kiln
- When the kiln is back at 932°F/500°C, time for 10 minutes, then remove the items from the kiln
- Place the pieces in a stainless steel container with at least one inch of activated coconut carbon surrounding each piece. There should be at least one inch of carbon between pieces and from pieces to the walls of the firing container.
- The firing container can be placed into either a cool or pre-ramped kiln for sintering. Ramp the kiln to 1508°F/820°C, hold for 60 minutes, longer for very thick pieces
- Allow to cool in carbon



ACW #D-030

Paper Towel Method

- Use about 1/4 sheet of paper towel. Lay a tablespoon of carbon in the center of the paper towel, place the piece in the center of the carbon, and put another tablespoon of carbon over the piece. Wrap the package so that carbon surrounds the entire piece. Lay the parcel on a fireproof surface, such as a firing board
- Fire in a pre-ramped kiln just as if Open Shelf Firing, 30-45min. Quench immediately

Prometheus® White Bronze

Prometheus® White Bronze must be fired in a kiln and has a multi-step firing schedule, much like other base metal clays. It has a shorter firing temperature range than Prometheus® Bronze, meaning that there is a much more specific target heat and hold combination you'll need to reach for proper sintering. Fire only a few pieces of white bronze at a time, and place them in the very center of the kiln. Pieces placed towards the edges of a kiln may not sinter fully. Generally, there will be a Phase 1 firing, which is open shelf and burns off the binder. Phase 2 firing is in carbon, and will sinter the white bronze. The final phase is a quick open-shelf firing to anneal the metal.

Manufacturer's Directions

Phase 1: Pre-ramp the kiln to 932°F. Place pieces on steel mesh and put into the hot kiln for 10 minutes. Cool.

Phase 2: Put a 3cm layer of activated carbon on the bottom of a steel container. Place pieces with at least 1.5cm space between each other and fill the container with carbon. Fire to 1420°F for 2 hours. Allow pieces to cool in carbon.

Phase 3: Anneal the pieces by heating to 1050°F for 5 minutes, then quench in cool water.

Suggested Tools for Working with Prometheus® Clays

Like other clays, Prometheus® bronzes can be formed, molded, sculpted, and shaped using your own hands, and just about anything else you can find lying around.

Standard Tools

Preferable for any project, these are the basic items:

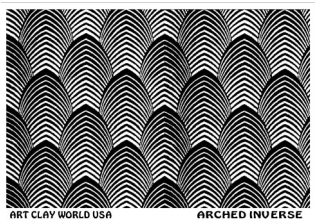
- Portable, hard working surface
- Thin non-stick surface
- Rolling tool
- Spacers (slats or playing cards)
- Small paintbrushes
- Cocktail straws
- Measuring tool (ruler, tape)
- Craft knife
- Small file set
- Needle tool
- Burnishing tools
- Tweezers
- Rubber block
- Sanding papers or sponges
- Drying apparatus
- Handheld torch
- Steel mesh
- Quenching container (should be made of metal)

Specialty Tools

These tools may be beyond the basics, but they are still easy to find and great to have available:

- Specialty-tipped shaping tools
- Clay sculpting tools
- Rubber stamps
- Silicone texture sheets
- Tissue blade or ceramic scraper
- Magnification lenses
- Specialty shape cutters (like fondant or small cookie cutters)
- Patinas
- Specifically-shaped brushes
- Gemstone-setting tools/burs
- Mandrels (ring, bracelet)
- Hand drill/pin vise
- Engraving tools
- Extruders
- Embossers
- Tumbler

Silicone-tipped sculpting tools are fantastic for sculpting layers or bits of clay together (ACW product #F-251)



Detailed texture sheets, like FlexiStamps, are perfect for easily adding crisp designs (ACW product #FS-189)

Graduated slat set for controlling clay thickness (ACW product # F-125)

Working with Wet Prometheus® Clays

Prometheus® clays are packaged as ready-to-go clays. They are pre-mixed, rather than powdered, and already have metal, binder, and moisture already together. However, working with the Prometheus® clays can be different from other pre-mixed metal clays you have used.

Prometheus® clays are formulated for sculptors and thus may be drier than other metal clays you have worked with. It is very simple to hydrate them to your own preferred consistency. Condition the clay and add a little water until you reach your desired moisture level. Prometheus® clays hold moisture very well and should not need to be rehydrated often.

Bronze Tree Pendants
by Carrie Story

Layering and attachments are easier with Prometheus® clays than with other base metal clays, thanks to Prometheus® syringes. Both regular bronze and white bronze have a syringe formula, which helps exponentially with attaching bits and pieces of Prometheus® clays together. Two pieces of wet clay can be connected with Prometheus® syringe between; two dry pieces of Prometheus® clays can be affixed with syringe; wet clay can be joined with dry clay using syringe.

In the absence of the syringe, a thick spackle can be made using the Prometheus® clay and water or Pastemaker™. A thick spackle is always better than a thin paste for attachments, and it is very important not to allow any air to be trapped under any layers or add-ons. The space underneath any added items needs to be completely filled with syringe or clay spackle in order to prevent oxidation during firing from acting like a barrier to the attachment.

Whenever possible, try to sculpt wet layers together with strong clay. This prevents oxidation and nearly always results in a strong attachment.

If you have leftover clay after a project, store it for later. There are many methods for storage, and their common theme is to use an air-tight container. One of the most cost-efficient storage methods is to wrap the hydrated clay in cling wrap, then place it in a small glass jar (like a baby food jar) with some moist sponge or wet paper towel. The wet media keeps the environment in the jar humid, the glass is absolutely non-porous, and the clay doesn't have the chance to dry out.

Embellishing Prometheus® Projects

Prometheus® clays are very compatible with many types of lab gemstones, as well as with many other metals, because of their lower firing temperatures and shorter firing times. Cubic Zirconia, lab spinel, lab aquamarine, and lab corundum are readily available on the market and fire very nicely with Prometheus® projects. Some natural stones, such as garnet, peridot, sunstone, and spinel may fire well if they do not have a large number of inclusions. Of course, whenever using gemstones, minor modifications must be made; cubic zirconia can be torch-fired but not quenched, and all other stones should not be torch-fired or quenched.

Pre-formed bronze elements are simple to use, and are intended to be embedded straight into wet bronze clays. There are a variety of bronze findings and settings, each made to be compatible with each of the bronze clay characteristics and firing schedules.

Bolas by Sabine Alienor

Drying and Refining Prometheus® Clays

Like all metal clays, Prometheus® clays must be fully dry before firing. Failing to remove all the moisture within the clay can result in pocking and damage to the piece as the wetness turns to steam while the piece is fired.

Because Prometheus is more dense than most clays, it may take longer to dry. It is recommended to flip pieces over to let each surface dry and evaporate moisture. Flipping the piece is especially crucial if you're using a direct-contact heated surface (like a griddle or mug warmer). Direct-contact is the fastest method for drying clay, but it is also possible to cause cracks as the clay shrinks while drying rapidly.

Mug warmers are a quick and efficient way to dry pieces
(ACW #F-247)

The density of Prometheus® clays make them generally sturdy while in the greenware state, but the pieces are still at risk for breaking if handled harshly. When sanding the edges of a piece, do so in the same direction as the edges and following the sides of the item, thus avoiding sanding that saws against the flow of the piece. While the clay density contributes to strength, it can make sanding more difficult. You may find that coarser materials work better than finer ones.

Pastemaker works with every metal clay to make paste or spackle, or to smooth surfaces and edges
(ACW #F-315)

If sanding a piece feels like it's not moving quickly enough, or that it's not efficient, consider smoothing edges with moisture. Even once dried, Prometheus clays are very receptive to water, and edges smooth easily. Small pocks and mars can be smoothed away with a dab of water or Pastemaker™ and a light swabbing with a small paintbrush.

Refine the entire surface of the clay piece. The entire surface area will polish to a shine even before firing!

Sanding sponges come in many grits and work well on all metal clay greenware
(ACW #F-210)

Prometheus and Paua Shell Pendant
by Sabine Alienor

There are even more opportunities for embellishment once Prometheus® clays have been fired. Dimension and color can be added with the use of resins; items such as abalone shell, paua shell, or even tiny microelements can be held within the resin. Surface treatments such as patina inks, alcohol inks, dye-oxides (such as Swellegant) and metal patinas are simple to apply and can create a lovely visual effect.

It is possible to enamel onto bronze clays, with some additional efforts towards proper preparation of the metals and the avoiding of oxidation.

With the proper tools, the surface of Prometheus® projects can be engraved or drilled after firing as well. As with any metal clay project, embellishing with beads, wire-wrapping, crystals, or fancy commercial findings can add plenty of personality to a piece.

Finger Ornaments by Carrie Story