



HEAT-RESISTANT CULTURED OPALS BUST OPEN NEW CREATIVE POSSIBILITIES FOR JEWELERS

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INTRODUCTION

Opals are known as the Queen of gems. Their sparkle, play of light, and color are mesmerizing and alluring in jewelry. Jewelers have been told natural opals cannot be cast in place in molten metal or fired in place in metal clay, and they need to be set traditionally with a bezel or prongs for inclusion in their jewelry. This is because it will become mere dust if you put extreme heat on it.

This all changed when we discovered a cultured opal that can take heat up to 1650°F/900°C. Yes, you heard that right, and the possibilities for artists have just burst wide open. Our minds went wild, and immediately we wanted our hands on them, because we needed to see for ourselves the heat tolerances of the stones and what you could and couldn't do. They were heated in a torch and in a kiln. They were tumbled and hand-polished in jewelry. They were exposed to patinas and submerged in vermiculite, carbon, and in casting sand. They were tested by a sand casting guru and several metal clay experts using various silver and base-metal clays and brands, to gather information that would help people enjoy using them with ease.

I'll be honest, in the beginning, I went through a lot of trial and error, but once I understood what I needed to do, it was easy, and now I share all the information gathering with you in this guide. This new discovery includes new techniques, a reference for historic significance, and a discussion about educating customers about their choices in buying cultured opals or natural opals by comparing and contrasting the pros and cons of each choice, including issues of sustainability, ethics, and forced labor concerns.



Figure 1: Fine Silver Metal Clay, Pink Lady Fire-in-Place Cultured Opal, Sterling Pin Back

Using cultured opals allows for:

- Brand new creative uses with heat applications not tolerated by natural opals.
- All levels of metal clay and metalsmith artists to use cultured opals with minimal equipment.
- Ease of use with additional options for setting cultured opals in place, reducing production time.
- Affordable choices for jewelers and customers without compromising quality, beauty and aesthetics.

ABOUT CULTURED OPALS

Firing with fire-in-place cultured opals (or FIP cultured opals) opens up a world of possibility. This new heat-resistant cultured opal is a fascinating top-quality opal that takes 12 months to grow by experts in a lab. The color play results from the way light interacts with the microscopic silica spheres, which have refraction indexes of 1.37 and 1.47, giving them their brilliant sparkle.

- These cultured opals can withstand temperatures to 1650°F/900°C in a torch or kiln.
- These cultured opals are also recognized by the Gemological Institute of America (GIA) as true synthetic opals having essentially the same chemical, physical, and optical properties as natural opals — silica and a small amount of water with microscopic spheres. Particular machines synthesize quartz — silicon dioxide (SiO_2), also known as silica. Synthetic opal is distinct from quartz despite both

being forms of silicon dioxide (SiO_2). The key difference lies in their structure: quartz is crystalline, whereas opal is non-crystalline. Essentially, opal is a different arrangement of the same fundamental material.

- These cultured opals are 5.5 on the Mohs scale.
- The cultured opal structure is stronger and less fragile than natural opal.
- This cultured opal does not decompose or release any substances or gases when heated to very high temperatures.



Figure 2: Pink Lady Fire-in-Place Cultured Opal

Safety Tested

Eurofins Scientific, a leading international group of laboratories providing a unique range of analytical testing services, has tested these cultured opals and has passed all regulations for Restriction of Hazardous Substances (RoHS), California Proposition 65, Registration, Evaluation, Authorization and Restriction of Chemicals (REACH).

Beware, not all cultured or lab-grown opals have the same properties, nor are they all heat resistant. Read their descriptions carefully, as they should have no polymers or resin in them.

Buying Opals

Buying opals can be confusing. What difference is there between natural, imitation, fake, cultured, lab-grown, and synthetic opal?

Natural Opals

These opals are mined from the earth. They can NOT be fired

in place — the heat would destroy them. The opal patterns are random and have not been enhanced in any way by humans other than to cut and shape them for jewelry.

Cultured, Lab-Grown, and Synthetic Opals

This category of opals and their titles are essentially interchangeable. Some can be fired in place, some can not. GIA has certified that cultured opal, lab-grown, and synthetic opal have essentially the same chemical, physical, and optical properties, but are grown by experts in a laboratory.

Imitation and Fake Opals

These are look-like opals. They cannot be fired in place. They differ from the natural opal's chemical makeup. Most imitation opals are made from glass, resin, or plastic.

HOW TO FIRE CULTURED OPALS IN METAL CLAY

Since working with the fire-in-place opals, several professionals in the metal clay community, along with myself, have tested many clays. Michael Galvin, Karen Trexler, Jade Reed, and Ann Adkins tested various brands of base-metal clays. I tested various silver metal brands. We continue to report our findings regularly as new metal clays appear on the market. The examples below give you an idea of the process for both silver and base-metal clays with slightly different processes and firing times. Please see Table 1 for the Firing Chart for specific clays.

The factors that make the majority of the difference between clays are the medium in which you fire in —vermiculite for fine silvers or carbon for any metal clay containing base metals such as bronze, copper, or sterling silver. The other factor is the amount of shrinkage of the clay. Up to 15 – 20% result in no problem, whereas higher shrinkage clays will require bezels fitting more loosely or using prongs to compensate for the shrinkage. This rule applies to all fire-in-place gems, not just these fire-in-place cultured opals. ANY high shrinkage clay needs room to shrink so if you are getting any cracking around the stone, it's either a bezel that is too tight or fissures in the clay to begin with.



Figure 3: Deep Vermiculite Burial (left), Coconut Carbon (middle), Torch-Firing on Vermiculite (right)

Firing in Silver Metal Clay

We tested these cultured opals with an azure, a hole behind the stone, in a deep burial of vermiculite with the following results:

Low-Fire Fine Silver

- These cultured opals can be fired for 30 minutes at 1650°F/900°C in a kiln with several fine silver brands that can fire at temperatures up to 1650°F/900°C and for shorter periods of time with no vermiculite burial.
- These cultured opals can be fired directly in a torch on a bed of vermiculite, stone facing down, and culet or pointed side facing up.
- Long, two-hour firings need to be buried in fine-grain vermiculite. The cultured opal is placed in the kiln, the stone table up or down doesn't matter, with the jewelry sitting on top of a 1/2" inch bed of vermiculite, and with 3/4" inches of vermiculite covering it.

Please see the Firing Chart that follows for specific clays.
(See *Beware* section below.)

Torch-Firing Fine Silver

These cultured opals can be fired directly with a torch on a bed of vermiculite, stone facing down, and culet or pointed side facing up.

Enriched Sterling Silver Clays

Enriched sterling is a metal clay that is between fine silver and sterling in tensile strength. It has a bit more fine silver in the formula than typical sterling to avoid the carbon firing several artists don't like because of the mess the carbon makes. We tested these cultured opals with an azure, a hole behind the

stone, in a deep burial of vermiculite with the following results:

- Enriched 950 and 960 silver metal clay have been successfully fired in a kiln as long as they do not pass the 1650°F/900°C threshold.
- Use fine-grain vermiculite to insulate the stone on the long firings, which protects it from hazing on the stone's surface. (We also found out that removing the haze with a diamond paste and a cotton handheld rotary tool is an option, but you want to avoid that.)
- The cultured opal is placed in the kiln, the stone table up or down doesn't matter, with the base of the jewelry sitting on top of a 1/2" inch bed of vermiculite, and with 3/4" inches of vermiculite covering it.

Please see the Firing Chart that follows for specific clays.
(See *Beware* section below.)



Figure 4: Fine Silver 999 Metal Clay and Cool Mint Cultured Opal Oval Cabochon by Holly (left) and Aussie Metal Clay 960 Sterling Silver and Bermuda Ocean Fire-in-Place Cultured Opal by Jade Reed (right)

Firing in Base-Metal Clays Such as Copper or Bronze

We tested these cultured opals with an azure, a hole behind the stone, with the burnout binder stage done on a bed of carbon, and the sinter stage done with a minimum of 1" of carbon covering the work. Different base-metal clays have specific firing schedules, and some manufactures specify a single stage firing, but all base-metal clays can be two-stage fired, which is generally more reliable and quicker. Please check manufacturers' firing recommendations, but you can also refer to the tested Firing Chart that follows for specific clays that were tested with the cultured opals successfully using the listed parameters. First and second stage were fired

without a lid or cover, but you can use a vented or askew lid for the second stage if you choose. Using a lid will reduce carbon consumption somewhat, and slow heating, so please add 25% to the sinter times in the table, and adding time will never hurt your project.

- Place the piece with the heat-resistant cultured opal facing down on an inch of coconut carbon for the initial phase to burn out the binders. Some testing was also done with the culet down with no ill effects.
- Set the kiln to the temp suggested.
- Fire for the designated time and temperature.
- Once the first phase is finished, pour an additional inch of carbon over the top of the piece. You do not need to handle the work, and it will be VERY fragile at this stage, so it is best left alone, but can be carefully moved if required. A lid can be added at this stage, but it should be vented, or placed slightly askew on the container.
- Ramp at the suggested temperature.
- Set the target temperature and hold time suggested.
(See *Beware* section below.)

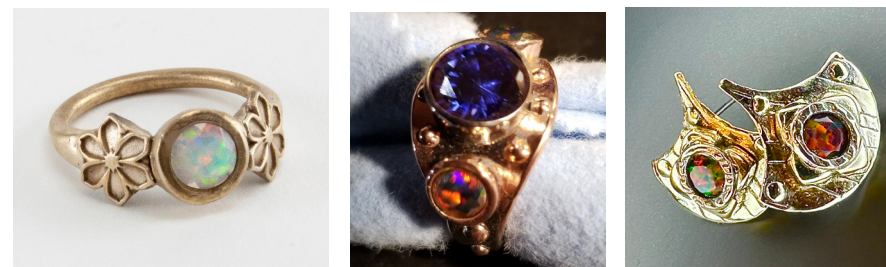


Figure 5: Aureus Bright Bronze with White Iridescence Fire-in-Place Opal by Karen Trexle (left), Copper Metal Clay and Black Fire-in-Place Cultured Opals by Michael Galvin (middle), Aussie Gold Bronze and Black Fire-in-Place Cultured Opals by Ann Adkins

Beware of Cracking or Hazing

- Don't exceed temperatures above 1650°F/900°C
If you exceed these temperatures you may get cracking or hazing of the stone.
- Re-firing these cultured opals - Proceed at your own risk.

We've had mixed results. A long, two-hour re-firing cycle at 1650°F/900°C in vermiculite was too much for a small cabochon stone and it cracked. Another larger cultured opal was fired twice with a short 30-minute firing at 1650°F/900°C and it *did* work. What's the difference? Either the size and thickness of the stone or the length of the firing or both affected the results. More tests are needed on this topic. Our best suggestion is when you re-fire, to repair cracks in the metal clay for example, fire at shorter times, and temps when possible.

- A stone not set deep enough into the vermiculite when needed can get hazy on the front or back surface. The haze can be removed with a tight cotton polishing head with a rotary tool and a small bit of diamond polishing paste.
- Not all cultured or lab-grown opals are heat resistant. Results may differ with different clays. Please see the list of clays tested in the chart. Other clays *may* work fine, but they have not yet been tested.

WORKING WITH FIRE-IN-PLACE CULTURED OPALS

Handling

When designing opal jewelry, it is a good idea to consider wear and tear and functionality of the jewelry. Even though cultured opals are 5.5 on the Mohs scale, making it a bit more durable than a natural opal, they still should be treated like any other opal -- with care. We see opals made into necklaces, rings and earrings, but if they are poorly designed, risk of scratching, cracking and breaking due to force upon the stone could occur. For instance if you are making a ring it will get a lot of natural wear and tear. Consider if the gem will have contact with other objects while in its setting, such as accidentally knocking it against tools at work or counters at home. Consider having the opal set deeply in the design, so there is no contact with the stones surface whatsoever.

Setting Cultured Opals in Metal Clay

Setting the opals is straightforward. The opals have been set in metal clay with 18% shrinkage with no ill effects. If you have higher shrinkage clay, a looser setting is recommended to allow for shrinkage. This is no different from any other gemstone in metal clay, and is a good rule of thumb.

Clean well with alcohol on both sides before putting it in the kiln. Set the fireable opal with an azure — a hole behind the stone is recommended to show off its beauty. Seeing the kiln white through

any translucent stone will look cloudy or milky in metal clay, and this is also a good general practice for all stone settings.

Tumbling in a Tumbler

How to tumble them safely:

Use Graftix® Incredible White Mask Liquid Frisket, a liquid latex that looks like a thin, milky liquid. When dry it is waterproof and can protect a stone from damage in a tumbler.

- Use a pin tool or small stylus to apply the Frisket.
- Apply enough to cover the stone front, then back after the front dries.
- You may add more after the first layer dries especially on the pointed side of the stone or cutlet of a faceted gem.
- Add enough to create a cushion of latex versus a thin coat.
- When dry it should look more cloudy-translucent versus milky.
- After it comes out of the tumbler, just peel off the Frisket.
- Wipe off tools immediately after use.
- You can speed up drying on a hot plate.

This works with any rotating, vibrating or magnetic tumbler with stainless steel shot. Check to see the Frisket is still on the stone after 30 minutes. If it came off, no worries just add more, your stone should be OK if exposed in the tumbler for a minimal amount of time. Do not use a coarse medium such as Hone and Shine which will quickly remove the Frisket as the medium is more aggressive.

Using a Patina Such as Liver of Sulfur

Liver of Sulfur or (LOS) does not affect the stone itself. If you are working with a translucent stone it might affect the appearance when you see the dark LOS behind it. This may be desirable or not depending on what the artist is looking to achieve with the effect. To test how color alters the appearance of the stone, place it on a black background or a silver background, for instance. Some people think the darkened metal makes the stone pop. Again, Use Graftix® Incredible White Mask Liquid Frisket, as mentioned above as a “resist” to prevent the LOS from getting on the metal wherever you don't want it to be.

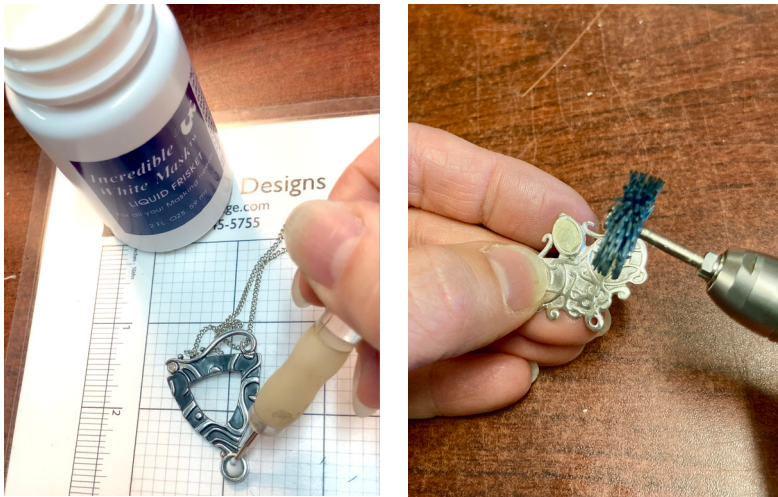


Figure 6: Graftix® Incredible White Mask Liquid Frisket is used to protect the opals in the tumbler and to resist LOS from getting on the metal behind the stone (left). Protect the opals when using a rotary tool by covering it with masking tape (right).

Cultured opals don't like extreme temperature changes like some other gemstones. So when using Liver of Sulfur don't heat your piece on a hot plate, but rather use warm, not hot water to make your LOS solution. As an extra precaution, I also will let my piece get to room temperature before rinsing in the cold water, this helps avoid thermal shock of the stone, and is a good guideline for many gemstones that are lower on the Mohs scale of hardness.

Rotary Tool Finishing

Use quality masking tape to protect the cultured opal. Burnish the masking tape down so it really sticks to the opal before using a rotary tool to do any polishing. These cultured opals are a bit more resilient than natural opals, but abrasive wheels will dull their shine. If you happen to scratch it, a muslin wheel with diamond paste should remove it, if not too deep.

EDUCATING CUSTOMERS ABOUT CULTURED OPALS IN YOUR JEWELRY

What does a person using cultured opals say to their customers about using them in their jewelry? My answer to such questions related to your choices in materials and design is to educate your customers. I don't mean the tech-talk jewelers use among

themselves, but short, concise, layman terms they can understand.



Figure 7: Fine Silver Metal Clay with Black Fire-in-Place Cultured Rose-Cut Opal and 5x7 Cabochon by Holly Gage

People care about what materials and gemstones you use in your jewelry, and I know you do too. Are they quality gems, natural, synthetic, or fake? Whatever you choose to use, you need to educate them about the values of your choices, as this helps consumers understand what they are purchasing and builds trust with them, which is an essential part of conducting a successful business. These questions come up most often. Luckily, you learned the difference between natural opals and cultured opals in the "About Cultured Opals" section above, and you can pass that information onto your customers with confidence. So, let's talk about basic facts about cultured opals and answer the most commonly asked questions.

Why would you use a cultured opal instead of a natural opal?

As the world becomes more educated and conscientious of how we treat the earth and the people on earth and understand the impact of gem mining practices, we need to make choices that benefit all of us. When we make good choices about our gems and materials and educate our customers, they can feel good about the jewelry they buy and feel comfortable supporting you as a responsible artist.

Human rights and environmentally friendly mining is an issue of concern as mining processes are affecting the gemstone industry at large. Forced labor and child labor have been an issue. It is vital to source your opals at conflict-free reputable dealers. This is not to say mining practices across the board are bad, but it is healthy for your conscience and business to take a second look at your sources with these issues in mind. Since cultured opals are lab-grown, no children or slave labor are sent into dangerous mines to work.

Cultured opals are sustainable gemstones without being mined out of existence, and have come a long way in their quality and consistency. What people are looking for in a quality gemstone is a consistent even cut and finish, fire, flash, and dynamic in the stone's color. Natural environments aren't disturbed in any way and require fewer natural resources to produce.

As mentioned above, cultured opals are a bit more durable due to the gems hardness making them more hard-wearing than natural opals.

Are cultured opals as valuable and worthy as natural opals?

Cultured opals are valuable! The quality, durability, ethical mining, sustainability, and affordability make these gemstones very attractive. Natural opals are rare, and some people covet this fact which drives the prices higher putting them at a premium. The question remains, what does a customer value as being important to them? Is rarity still the standard or are environmental and sustainable issues just as important?

It is business-wise and ethical to state what is in your jewelry, the type of metal hallmarked, and the gems used. It is critical to avoid questions or deception in sales, not to mention the Federal Trade Commission states there should be honesty in labeling.

My favorite aspect about using the new fire-in-place cultured opals is they elevate my designs, and the ease with which they can be added to your metal clay work makes them valuable additions to your jewelry toolbox.

Table 1: Metal Clay and Cultured Opal Firing Chart

Clay	Torch Firable	Medium
Art Clay Fine Silver (999)	1650°F - 2 hrs Torch Firable	Deep burial vermiculite
Project X Fine Silver 999	1650°F - 30 mins Torch Firable	Deep burial vermiculite. Consider design options as shrinkage is 22-26%
Art Clay 950 (Enriched Sterling)	1500°F ramp to target temp 932°F. Hold 30 min. 2nd ramp 1650°F to 1625°F, hold 2 hours; 960 - Successful firings at 1550°F ramp to 1650°F for 2 hours.	Deep burial vermiculite
Phoenix Fine Silver (999)	1650°F - 2 hrs Torch Firable	Deep burial vermiculite
PMC3 (999)	1650°F - 2 hrs Torch Firable	Deep burial vermiculite
960 (a 50/50 mix of Art Clay Fine Silver and 925 PMC Sterling)	Ramp 1350°F, target temp 1650 ° F for 2 hours.	Deep burial vermiculite
Aussie Metal Clay 960	800°C (1472°F). Target temperature is 910° C (1670°F). Hold for 1 hour, 45 min., The piece is placed on a bed of Kim's No Fuss Fire Medium (KNFF) 2 cm (.78" or roughly 3/4"). A 2 cm coating of KNFF is spooned over and into the pieces.	Coconut Carbon, Kim's No Fuss Fire Medium (KNFF)
Cool Tools Arcus Bright Bronze	Ramp 1350°F, hold 30 min. at target temp 650°F. Second phase: pour an add'l inch of carbon over the top of the piece. Ramp at 1350°F. 2 hour hold at target temp 1400°F.	Coconut Carbon
Cool Tools Cyrus Copper	Ramp 1350°F, hold 30 min. at target temp 650°F. Second phase: pour an add'l inch of carbon over the top of the piece. Ramp at 1350°F. 3 hour hold at target temp 1650°F.	Coconut Carbon
Art Clay Bronze	Burnout 720°F for 30 minutes, Sinter 1500°F for 1.5 hours. 1" bed of carbon, then covered with 1/2" minimum of carbon for the sintering stage.	Coconut Carbon
Five Star Copper	Burnout 750°F for 35 minutes, Sinter 1650°F for 2 hours. 1" bed of carbon, then covered with 1/2" minimum of carbon for the sintering stage.	Coconut Carbon
Goldie Copper	Burnout 1,050°F for 45 minutes, Sinter 1,650°F for 3 hours. 1" bed of carbon, then covered with 1/2" minimum of carbon for the sintering stage.	Coconut Carbon
Goldie Bronze	Burnout 700°F 30 minutes, Sinter 1,520°F 1.25 hours. 1" bed of carbon, then covered with 1/2" minimum of carbon for the sintering stage.	Coconut Carbon
Metal Adventures BronzClay (not fast fire)	Burnout 700°F for 45 minutes, Sinter 1,650°F for 3 hours. This is a significantly lower temperature than recommended for White Copper (slow ramp in carbon, then 1,850°F for 2 hours). It sintered just fine at the lower temperature for an extended 3 hours.	Coconut Carbon
Aussie Metal Clay Gold Bronze	Burnoff in the Kim's No Fuss Fire Medium (KNFF), put the charcoal on top and fired at 1475 F for 2 hours.	Coconut Carbon, Kim's No Fuss Fire Medium (KNFF)

SAND CASTING FIRE-IN-PLACE CULTURED OPALS

Sand casting is an ancient jewelry-making technique that involves using jeweler's sand as the molding material; Delft clay, and even beach sand are used to create a mold. Sand casting allows jewelers to create castings in their own studio cost-effectively versus sending your master model to a casting house. Each piece is unique since the jeweler can only use the molds once.



Figure 8: Sterling Silver Cultured Opal Rings by Nadine Citerne.
(Left to Right) Bermuda Ocean Opal, 5 mm;
Pink Blush, 3 mm; Cool Mint, 4x6 mm

Sand casting stones are known to be tricky, and nothing is guaranteed as stones can crack or move out of place, so I went to Nadine Citerne of Nadine Suzanne Jewellery, who is the mad scientist who conducted proof testing for the cultured fire-in-place opals in the sand casting process. She creates one-of-a-kind sand cast jewelry inspired by the ocean and often has cast stones in place, making her the perfect person for testing. Nadine incorporates unique elements like beach sand, resulting in beautiful textures and organic details you will see in the successful pieces.

Sand Casting Process

1. Models Used for Casting

Common designs used can be cast rings, pendants, and bezel rings. Signet rings are also widely made using this method. A master, usually made of wood, plastic, or metal, is created. Jeweler's wax is the typical master used as a mold alongside found objects such as shells, buttons, etc.

Nadine usually starts by carving a design in wax. The wax models are carved to allow 0.5 mm space for the metal to flow behind the stone and wrap around it, securing it in place.

The wax model is then placed in a container called a flask, which is packed tightly with the jeweler's sand to capture all the details of the master. Ring-making wax is hard, easy to carve, and does not break easily when pressed into the sand.

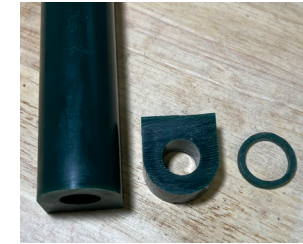


Figure 9: The Jeweler's Wax used to Carve the Ring Design

2. Sand Used for Testing

Nadine uses two common types of sand available on the market.

- Red Clay is sand manufactured and sold by DIY Castings.
- Delft Clay is commonly found in most jewelry supply stores.

3. Sand Casting Flask

A flask is an open container that holds the sand and supports the mold during the casting process. It has no top or bottom, just sides. The flask consists of two parts, called male and female. The male side has a protruding lip and vent holes.



Figure 10: Sand Casting Flask

4. Filling the Male Side of the Flask with Sand

Sand is packed into the male side of the flask from behind using a hammer, and the top is leveled off.



Figure 11: Sand packed into the Male Side of the Flask

5. Adding the Wax Model

The wax is pressed halfway into the sand, and baby powder is brushed over this half of the mold so that the two sides do not stick together.



Figure 12: Wax Model is Pressed Halfway into the Sand and Baby Powder is Brushed Over the Top

6. Filling the Female Side of the Flask with Sand

The female side of the flask is placed on the male side, and the sand is packed in from behind and leveled off.

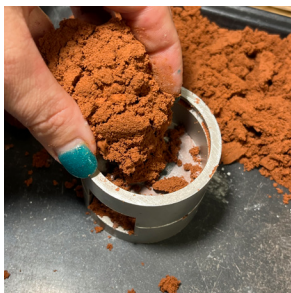


Figure 13: Add the Female and Fill the Flask with Sand

7. Removing the Wax

The flask is then separated, removing the female from the male straight off without twisting. The wax model is carefully removed, leaving a cavity for the metal to flow into.



Figure 14: Remove the Wax Mold

8. Sprue and Vents

Sprue and funnel are created to allow the metal to be poured into the mold. The sprue and funnel connect to the cavity created by the wax mold. This is where the molten metal will be poured into. The funnel is designed to pool any excess metal.

Vent holes are also added. These help the gas escape. When the metal is poured in, the gas needs to escape. These vent holes help the gas escape and also act as a vacuum, drawing the metal down.



Figure 15: Add the Sprue and Vents

9. Pouring Molten Metal

All of the rings tested were cast using a Smith Little Torch with a rosebud tip. After the mold is assembled, molten metal is poured into the gate, filling the cavity. The metal then cools and solidifies in the shape of the design, which forms the cavity.

Note: The other common type of torches used are MAPP gas bottles – these are handheld torches, but they don't melt the silver as quickly as the Smith torch.

- **Top Pour:** Pouring metal from the top of the flask. This method is commonly used for pendants and flat objects.
- **Side Pour:** Pouring from the side of the flask, typically used for rings.



Figure 16: Pouring Molten Metal (left), Top-Pour and Side-Pour Flasks (right)

10. Removing the Casting

The metal is allowed to cool and solidify. Once the item is cast, the mold is opened right away, and the raw cast is removed and left to cool down. If the item does not have stones cast in place, it can be cooled right away in water; however, due to thermal shock to the stones, the items were left to cool on their own.

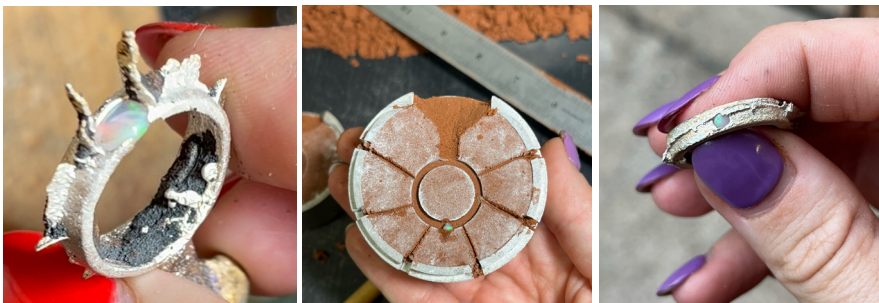


Figure 17: Remove the Cooled Metal Casting (left), Opal in the Mold with papaw ointment (middle), Pink Blush Cultured Opal Cast in Sterling Silver (right)

Casting Cultured Opals in Place

After creating the mold, clean and place the opals inside the cavity. The cultured opals have a thin layer of papaw ointment (petroleum-based jelly) on the table of the stone to help prevent them from moving around in the mold. However, beware, when sand casting any stones in place; you are never guaranteed placement or whether the stone will survive. The 'cast-in-place' look gives a rough and organic feel to a piece.

- **Casting stone placement:** All cultured opals have a thin layer of papaw ointment applied to their tables to prevent them from moving around in the mold. After casting, no rings were placed in water; they were left to cool naturally to avoid thermal shock.
- **Stones that were used in casting:** Faceted and cabochon cultured opals were tested. Faceted opals, size 3-6 mm, were successful. A few cabochons did not survive; however, the 4x6 mm Cool Mint cultured opal cabochon was shallow and survived, possibly for that reason. They are not commonly used in the sand casting or lost wax method as cabochons are more susceptible to thermal shock during casting in metal because they are not good conductors of heat and can suffer shock during rapid heat or cooling.

Finishing and Polishing

The piece is ground to remove excess metal, cleaned, finished, and polished to achieve the desired texture and appearance. Please refer to the "Working with Fire-in-Place Cultured Opals" section, which looks at tumbling, patinas, and rotary tools, as well as protecting the cultured opal during those processes.

METHODS OF SAND CASTING AND CONCLUSIONS

Bermuda Ocean Round Faceted Cultured Opal (6 mm)

Metal: Sterling Silver
 Method of Casting: Core Casting/Vacuum Table
 Mold Heated: No
 Damage to Opal: None
 Color Change: None
 Conclusion: Would I cast with this cultured opal? Yes

Note: After removing the ring from the flask, the opal appeared dull. Cleaning restored its initial beauty and sparkle.

Pink Blush Round Faceted Cultured Opal (3 mm)

Metal: Sterling Silver
 Method of Casting: Standard Flask – Side Pour

Mold Heated: No
 Damage to Opal: None
 Color Change: None
 Conclusion: Would I cast with this cultured opal? Yes

Black Fire Round Faceted Cultured Opal (5 mm)

Metal: Sterling Silver
 Method of Casting: Core Casting/Vacuum Table
 Mold Heated: Yes
 Damage to Opal: Yes
 Color Change: None
 Conclusion: Would I cast with this cultured opal? Yes, because the color is amazing. I'd try again without heating the mold.

Note: The opal looked good after removing the ring from the mold with no visible cracks. However, using a graver during cleanup to expose the stone more caused it to crack, possibly due to the opal's fragility from the casting process and my actions.

Recommendations for success

As mentioned earlier, there are no absolute guarantees with sand casting, but there is great proof that success is not only possible with cultured opals, but achievable even when others who work in the field of sand casting were in doubt.

- Cabochons are more challenging to sand cast in place than faceted stones because they have a smooth, curved surface, making it difficult to secure them properly in the mold. Faceted stones, with their multiple flat surfaces, can be more easily positioned and held in place. In addition, cabochons are more sensitive to high temperatures involved in sand casting, leading to a greater chance of thermal shock resulting in cracking. This is because they are not good conductors of heat and can suffer shock during rapid heat or cooling.
- This may be because the dome shape may not be as stable as your typical faceted stone.
- The best sizes to work with are 2–5 mm, but again, a 6 mm worked with no problem.
- Be careful with your tools, including the popular graver, when removing metal around the stone. Use a protective barrier, such as several layers of masking tape placed over the stone to help prevent accidental scratches or chips.
- Not all cultured or lab-grown opals have the same properties nor are they all heat resistant. Read their descriptions carefully, as they should have no polymers or resin in them.

EDUCATIONAL RESOURCES

Where to Buy Fire-in-Place Cultured Opals

- Gage Designs: www.HollyGage.com
- Healing Phoenix Lapidary: www.HealingPhoenixLapidary.com

Metal Clay and Sand Casting with Fire-in-Place Cultured Opals

- Metal Clay and Sand Casting and Fire-in-Place Cultured Opal Education: www.HollyGage.com
- Metal Clay and Sand Casting and Fire-in-Place Cultured Opal Education: www.HealingPhoenixLapidary.com

Metal Clay with Fire-in-Place Cultured Opals

- Metal Clay and Fire-in-Place Cultured Opal Education. Also, see the Blog for in depth process testing information: www.HollyGage.com
- Art Clay 999, Art Clay 950, and Art Clay Bronze: www.artclayworld.com
- Aussie 960 and Gold Bronze, KNFF: www.aussiemetalclay.com
- Cool Tools Areus Bright Bronze, Cool Tools Cyprus Copper, Phoenix Fine Silver 999: www.CoolTools.us
- Goldie Copper, Goldie Gold Bronze
- Project X Fine Silver 999: www.ClayRevolution.com
- Coconut Carbon: www.CoolTools.us
- Fine Grain Vermiculite: A garden store or any Metal Clay Supplier

Sand Casting with Fire-in-Place Cultured Opals

- Sand Casting information videos and education: www.NadineSuzanneJewellery.com and www.instagram.com/nadinesuzannejewellery/
- Fire-in-Place Cultured Opal Education: www.HealingPhoenixLapidary.com
- Casting Supplies and Red Clay: www.diycastings.com
- Gage Designs: www.hollygage.com

Note: Recently discontinued metal clay brands not listed in the resources may still be possessed by makers, and are included in the "Metal Clay and Cultured Opal Firing Chart."