

METAL CLAY AND HEALING PHOENIX LAPIDARY FIRE IN PLACE CULTURED OPALS



*Fine Silver Metal Clay
Pink Lady Fire in Place
Cultured Opal
Sterling Pin Back*

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.

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.

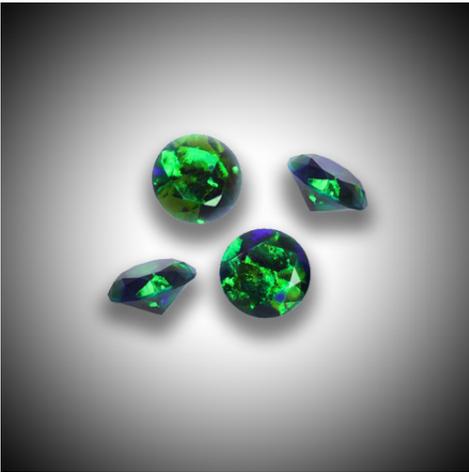
ABOUT CULTURED OPALS

Firing with Fire in Place Cultured Opals (FIP) 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 or 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,



Pink Lady Fire in Place Cultured Opal 8mm Trillion



Green Fire, Fire in Place Cultured Opal 4mm

physical, and optical properties as Natural Opals — silica and a small amount of water with microscopic spheres. Particular machines synthesize quartz — silicon dioxide (SiO₂), also known as silica. Synthetic opal is distinct from quartz despite both being forms of silicon dioxide (SiO₂). 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.

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 Opal, Imitation Opal, Fake Opal, Cultured Opal, Lab-Grown, and Synthetic Opal? What????

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 Opal, Lab-Grown, and Synthetic Opal

This category of Opals and their titles are essentially interchangeable. Some can be fired in place, some can not. The Gemological Institute Of America (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.

Imitations 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 Glavin, Karen Trexler, Jade Reed, and Ann Adkins tested various brands of Base Metal. 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 the Firing Chart that follows 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



Deep Vermiculite Burial



Coconut Carbon



Torch Firing on Vermiculite

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.

HOW TO FIRE CULTURED OPALS 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 and for shorter periods of time with no vermiculite burial.



Fine Silver 999 Metal Clay and Cool Mint Cultured Opal Oval Cabochon by Holly Gage



Aussie Metal Clay 960 Sterling Silver and Bermuda Ocean Fire in Place Cultured Opal by Jade Reed

- These Cultured Opals can be fired directly in a Torch on a bed of vermiculite. Stone facing down, culet or pointed side facing up.
- Long 2-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, 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 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.

*Copper Metal Clay and
Black Fire in Place Cultured
Opals by Michael Galvin*



*Aureus Bright Bronze with
White Iridescence Fire in
Place Opal by Karen Trexler*



*Aussie Gold Bronze and Black
Fire in Place Culture Opals by
Ann Adkins*

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

HOW TO FIRE CULTURED OPALS 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 manufacturers 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 ramp 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.)

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 2-hour refire cycle at 1650°F 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 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 refire, 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 hazy 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 6 - 7 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.



Grafix® 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.



Protect the Opals when using a rotary tool by covering it with masking tape.



*Fine Silver Metal Clay with Black Fire in Place Cultured
Rose Cut Opal and 5 x 7 Cabochon by Holly Gage*

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 Grafix® 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 outlet 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 course 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 Grafix® 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.

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 Culture 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.

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 section “*About Cultured Opals*” 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 gets more educated and conscious 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 the Cultured Opals valuable and as worthy as the 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 hallmarking, 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 it elevates my designs, and the ease in which the Cultured Opals can be added to your Metal Clay work makes them valuable addition to your jewelry toolbox.

EDUCATIONAL RESOURCES:

Where to Buy Healing Phoenix Lapidary Fire in Place Cultured Opals

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

Holly Gage of Gage Designs, is a celebrated jewelry designer. She has been honored with the Saul Bell Design Award for her distinction in jewelry design and the AMCAW Innovation Grant Award for her groundbreaking work in developing firing techniques for Fire in Place Cultured Opals in jewelry. Holly is a pioneer in the Metal Clay community, specializing in creating contemporary jewelry and sharing her unique techniques through a blend of design instruction and technical proficiency. She is dedicated to fostering innovation, creativity, and helping others find their artistic voice through her classes, mentoring programs, master workshops, and retreats, which are available live online, at her studio in PA, in the US, and internationally. Holly holds a BS in Fine Art and Education and is a full-time jewelry artist, Certified Metal Clay Instructor, author, and conference speaker. Her jewelry and articles on techniques and design have been featured in over 80 regional and national publications, including the Best of America Jewelry Artists, Handmade Business: Named 3rd in Top Makers, Movers, and Shakers, and Metal Clay Today. For more information about Holly's jewelry, classes, awards, as well as Metal Clay tips, tutorials, and blogs, you can visit her website at <http://www.HollyGage.com>.

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METAL CLAY AND HEALING PHOENIX LAPIDARY 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 1350°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 Areus 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 1,500°F for 1.5 hours. 1" bed of carbon, then covered with 3/4" minimum of carbon for the sintering stage.	Coconut Carbon
Five Star Copper	Burnout 750°F for 35 minutes, Sinter 1,650°F for 2 hours. 1" bed of carbon, then covered with 3/4" 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 3/4" 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 3/4" minimum of carbon for the sintering stage.	Coconut Carbon
Metal Adventures BronzClay (not fast fire)	Burnout 700F for 45 minutes, Sinter 1.650F for 3 hours. This is a significantly lower temperature than recommended for White Copper (slow ramp in carbon, then 1,850F 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)