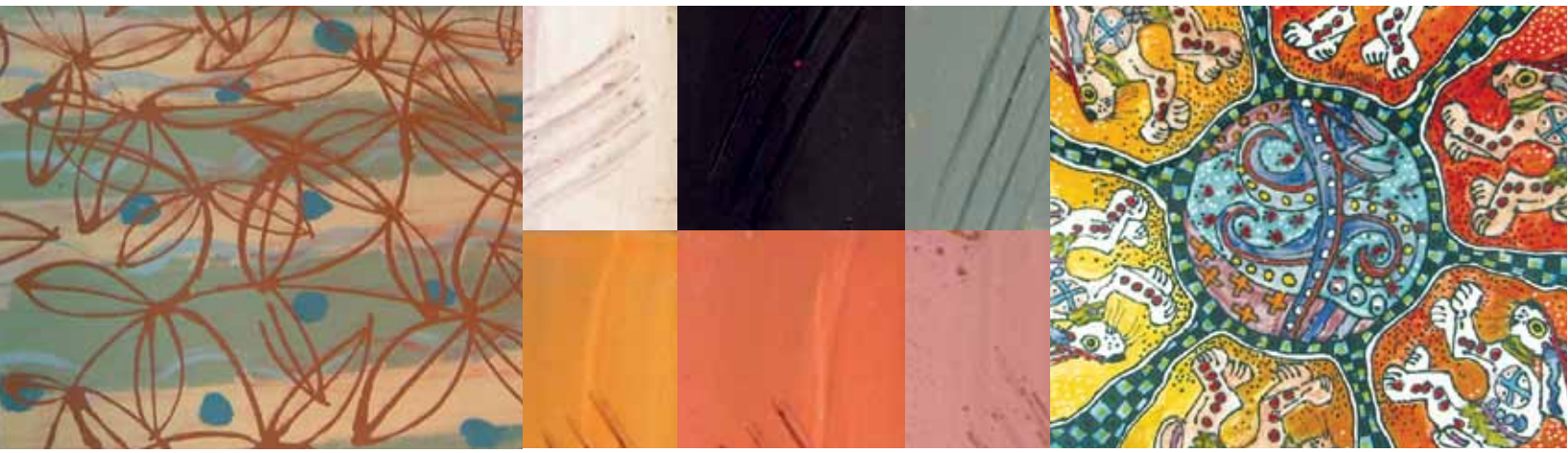
underglaze
users guide



how to use underglazes to add color and graphic interest to your pottery projects

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Underglaze Users Guide

How to Use Ceramic Underglazes to Add Color and Graphic Interest in Your Pottery Projects

Underglazes are basically clay-based materials with ceramic stains and metallic oxides added to create a full spectrum of color in your work. They're the fastest, easiest, and most dependable way for you to add pizzazz to your pottery or sculptures for just an accent or an entire surface treatment. Like many other art materials, underglazes come in a wide variety of forms—liquid, dry, chalks, pens, and pencils—so no matter what your background, a ceramic surface awaits your colorful treatment.

Laura Kukkee: Using Underglazes for Slip Trailing and Appliqué Techniques

by Anderson Turner

There is no shortage of application techniques using ceramic underglazes. Laura Kukkee creates her decoration with underglazes on newspaper then transfers it to a freshly rolled clay slab. She builds up layers of differenct colored slips and underglaze decoration on newsprint to create a very thin slab. Then she cuts the slab into pieces and uses an appliqué technique to apply the decorated pieces to pots. She also demonstrates silk screened and inlaid appliqué.

How to Make Homemade Underglazes

by Holly Goring

Whether you want to make your own underglazes or use commercially prepared underglazes, this article will provide a valuable understanding of what underglazes are made of and how they behave. Regardless of which way you want to go with underglazes, knowing how they are made will help you know how to use them more effectively—and that means better chances for success in the studio.

9 Artists Using Colorful Underglazes

by David Gamble

With so many ways to use underglazes, it opens up so many opportunities. Just take a look at the effects Jim Kemp gets by spraying vivid colors on his teapots or how David Gamble expertly obtains a sketchbook feel with thinned out underglaze washes. Debra Fritts applies layers of underglazes and removes them to achieve her stunning patinas and Rimas VisGardas maximizes the underglaze's ability to provide bold illustrations. These artists and five more explore many possibilities you can delve into to add life and vibrancy to your work.

Laura Kukkee Demonstrates How to Use Underglazes

For Slip Trailing and Silk Screening Appliqué

by Anderson Turner

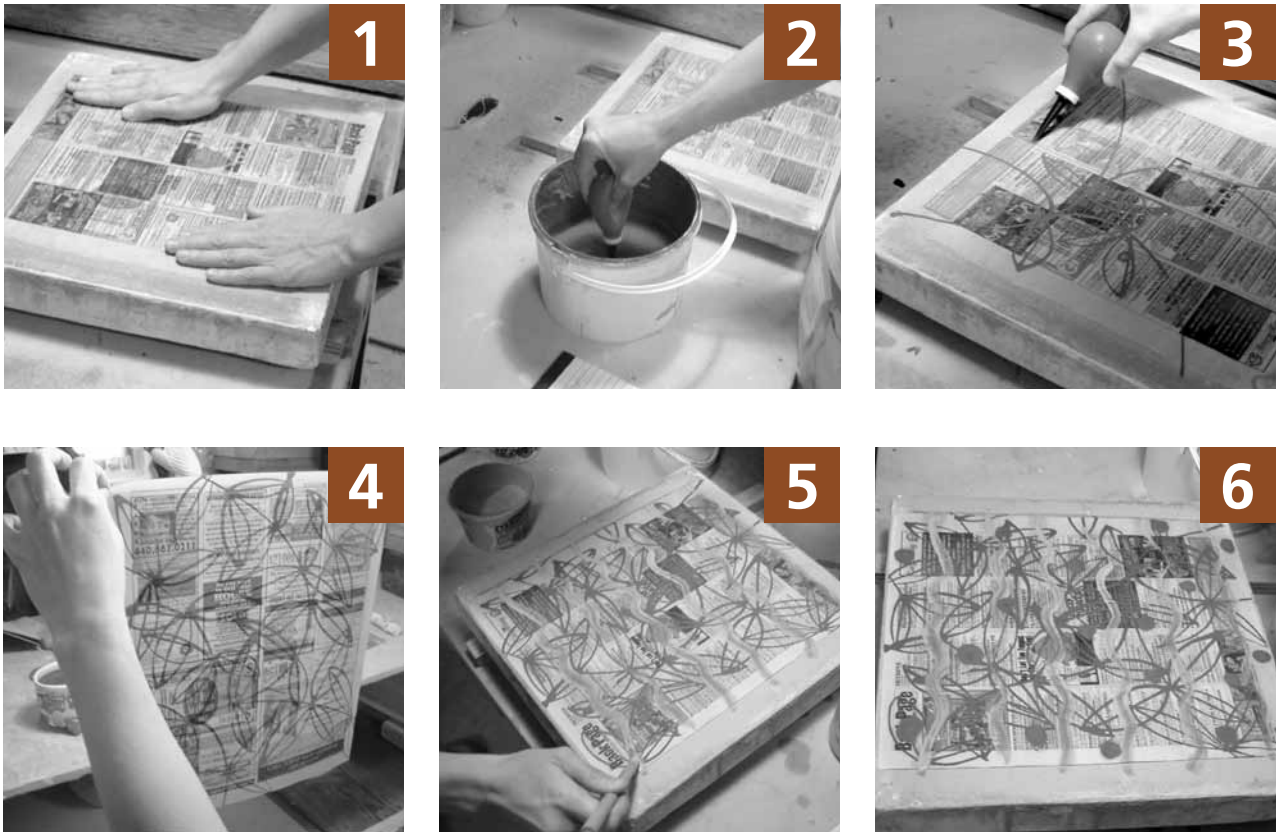
Untitled, 23 in. (58 cm) in diameter, monoprinted (paint, slip trail, silk screen) slips on soft slabs, glazes, and sand then multifired.

It is often taught that artists must strive to be wholly original. We must envision something great and new and then apply it to our art, thus astounding all who happen by the work we've made. This is a tall order to say the least. Many a great idea has fallen by the way side because the artist is unsure of how to execute the desired result. Often, it is the subtle change in a technique that can lead to impressive results. One example of that type of change is in the work of artist Laura Kukkee.

Laura, a native of Toronto, Canada, did her undergraduate studies with Bruce Cochrane at The Sheridan School of Crafts and Design in Oakville, Ontario and developed this technique in the craft studios at Harbour Front Centre in Toronto. Utilizing slips and underglazes in the decoration of clay has been happening for thousands of years. From the Ancient Greeks and Chinese to the 17th-century country English potter, the use of colored slip has been an important part of the decorative arsenal of nearly every clay artist.

Laura is currently working with ideas surrounding the notion of a fragment. "This fragment is in the form of an image or a pattern which is divorced from its original meaning. By pulling fragments outside of their traditional contexts and restructuring the way in which they are presented, meanings become

Slip Trailing Appliqué



more elastic." Her results in the research are both exciting and new, and they offer a chance for individuality that every artist strives for.

Notes on Slip

Slip, as defined by Vince Pitelka in his book *Clay: A Studio Handbook*, is clay suspended in water, usually the consistency of thick cream. It may be colored and used to decorate surfaces, or may be cast into plaster molds to create ceramic forms. For her artwork, Laura uses slip the consistency of a thick cream as well as a slip that is substantially thinner. **Note:** Commercial underglazes can also be easily substituted for the slips. She uses different proportions of water and a small amount of Darvan #7 to get the "flow" of the slip she desires. It's a good idea to test all slips and underglazes before using them on your own work.

Slip Trailed Appliqué

What you'll need: ball syringe, newsprint, spray bottle, and plaster slab (optional). Laura sets the plaster on two pieces of wood to keep slab well ventilated, thus discouraging mold. You will also need the colored slips or underglazes of your choice.

Wet a piece of newsprint using a spray bottle so that it is damp but not soaked. Smooth the paper out onto the plaster slab, so you don't get ridges—smoothing helps the paper absorb water (*figure 1*).

Remember, whatever color you use first is going to be the outline of the pattern you're making. You're building color and pattern from the top layer down with the background color applied last, which is the opposite direction one normally works. For this demo, I'm using black slip, though I have often used other colors. It's a good idea to mix and sieve slip thoroughly beforehand to blend all the materials.

Dip the syringe in the slip and fill it (*figure 2*). To get the bulb flowing, try practicing on an extra sheet of paper before beginning (*figure 3*). Slip trail pattern or image of your choice onto paper. Pick the paper up by the edges carefully and hold it up to light so you can see your pattern better (*figure 4*). Set the paper aside and allow slip to dry until the sheen goes away, then start laying color in and around the pattern (*figure 5*).

I like to apply bands of color together behind the pattern. Set aside the paper and let dry until sheen disappears (*figure 6*).

Again, once sheen is gone, cover the colored slip with a white slip made of the same ingredients as your clay body, with roughly 3% Darvan #7 added to the mixture. Make sure the slip is really flowing. Set aside and allow to dry until the sheen goes away or you're ready to use. I often apply up to four applications of white slip depending on how thick I

Recipes

Sheridan Studio Colored Slip

Cone 6-10

Kona F4 Feldspar	24.6%
Pyrophyllite	8.2
Grolleg Kaolin	45.8
Bentonite	5.1
Silica	16.3
	100.0%

Plus 15% stain of your choice.

Clay Body

Cone 6

G200 Feldspar	45 lb
Whiting	4
Ferro Frit 3124	10
6 Tile Clay	50
Kentucky OM4 Ball Clay	25
Bentonite*	3
EPK Kaolin	25
Silica	45

Plus 2 handfuls of Epsom salts
* soak bentonite overnight.

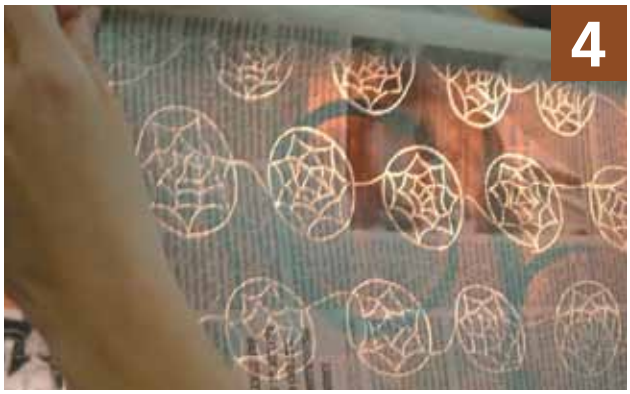
want the slab to be. Usually though, one application is enough (*figure 7*).

Take the slip-trailed sheet and cover with paper, then smooth (*figure 8*). Flip the slab over, keeping the new sheet of paper in place. Spray the paper with water until damp. Flatten the paper so that water spreads evenly (*figure 9*). Begin peeling the corner of the paper, being careful not to rip the clay sheet (*figure 10*). This will reveal the slip-trailed pattern (*figure 11*).

Take another piece of paper and place it over the pattern. Make sure to smooth it out, as this helps remove moisture (*figure 12*). Flip the slab over and remove the paper (*figure 13*). Now you're ready to cut shapes to apply to your pot, based upon your design (*figure 14*).

Remove excess clay from around the shapes (*figure 15*). Gently peel up one of your shapes. Brush slip onto the white side of the piece using the same white slip. Because of the Darvan #7, there is no need to score (*figure 16*). Gently press the piece onto the pot or sculpture you've made. The pot should be soft leather hard (*figure 17*).

Inlaying Slip Appliqué



Inlaying Slip Appliqué

Begin this process in exactly the same way as the slip trailing. Brush the slips in a design covering the paper. In this example Rahill is using a large pattern and bold colors. Set the paper aside to dry (*figure 1*).

Once the gloss is gone, cover the design with the white slip made from your clay body with approximately 3% Darvan #7 added to the mixture. Set aside (*figure 2*).

When the sheen has dissappeared from the white slip, carve shapes in the slip. Be careful not to cut through the newspaper (*figure 3*).

When you finish the pattern you should be able to see light through the design.

Cover entire sheet with black slip. Set aside to dry. When the gloss is gone, cover entire piece with white slip (*figure 4*).

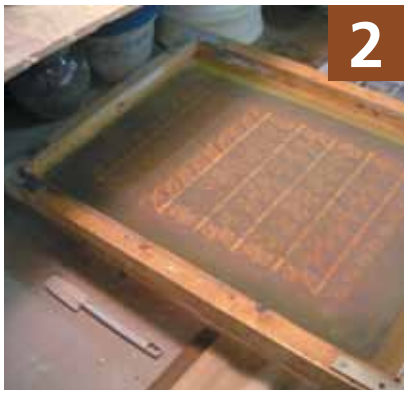
Smooth a sheet of newspaper over the slab, flip it over and carefully remove the paper from the pattern side, and spray with water, if necessary, to keep from tearing the slab (*figure 5*).

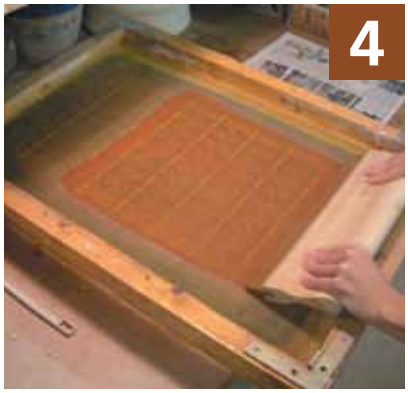
Place fresh paper over the slab, smooth, and flip the slab again. Peel the paper off the back of the slab. The slab can now be cut into shapes for appliqué (*figure 6*).

Once the excess clay is removed from between the shapes, begin to gently peel up the cut out patterns (*figure 7*).

Paint white slip onto the white side of each piece and gently apply the shape to the pot (*figure 8*).

Silk-Screening Slip Appliqué





Silk Screening Appliqué

Items you need: squeegee, spatula, metal rib, small pitcher, brushes, a pointed tool, and various colored slips. Prepare paper the same way as in the previous examples (*figure 1*). Position the silk screen on top of the prepared paper (*figure 2*). Pour a bead of black slip on the screen at one end only (*figure 3*). Squeegee slip across the screen with steady, even pressure (*figure 4*). Use a metal rib to remove excess slip from the silk screen (*figure 5*). Carefully remove the paper from the silk screen to avoid tearing the pattern (*figure 6*). After the pattern is screened onto the paper, let it dry until the gloss is gone (*figure 7*). Apply colored slip over the design and allow to dry (*figure 8*). After the slip loses its sheen, cover the entire sheet with white slip and set aside to dry (*figure 9*). Flip and add fresh newspaper. When this process is completed, begin to cut out the shapes (*figure 10*) Once the excess clay is removed, gently peel up the cut out shapes (*figure 11*). Paint white slip onto the white side of the shape and apply it to the pot (*figure 12*).

Three completed forms with applied slip decoration.

Homemade Underglaze

by Holly Goring

The truth is, I was a nerdy ceramics undergraduate student. I wanted to learn everything, right away—and I loved my glaze calc class. No, really, I did. I took a ridiculous amount of notes and then put them all in plastic sleeves in a binder. I'm sure I tested every recipe I could find or invent. After discovering commercial underglaze, I was sure I could make that too.

Smooth, silky, perfectly opaque, commercial underglaze is that wonderful substance that coats and colors both greenware and bisque ware with ease (I've even seen it work on mature cone 04 earthenware), and without flaws. And, in terms of color, what you see is what comes out of the kiln, no guessing, no hoping. They are dependable as well; covering large areas quickly with smooth and consistent brush painting. They take light-colored, transparent or clear glaze very well without dissolving into the glaze during the firing. Finally, commercial underglaze fires into a hard, unscratchable surface without pinholing or flaking from cone 04 all the way to cone 10.

Commercial Underglazes

Today, most commercial underglazes are formulated using frits, which reduce shrinkage, allowing them to be applied to both greenware and bisqueware. They are produced using a colloidal process. A colloid is a substance microscopically dispersed evenly throughout another substance (think mayonnaise or hand cream). Underglaze manufacturers use a chemical process that employs a high-shear mixing technology to create colloids. The substance created does not settle and cannot be separated out by ordinary filtering or centrifuging like those in a typical suspension. This allows for complete integration of all raw materials, including the colorant, during the base mixing stage.

Underglaze applied over red earthenware. White slip was applied to half of each test tile before bisque firing. This is noticeable in the white, orange, and red tiles where the application was thinner. See recipe on next page.

Developing the Recipe

Variations of underglaze recipes were available on the Internet but not much could be found in textbooks, beyond iterations of slips (clay suspended in water, formulated to fit either to wet or dry greenware) and engobes (generally a lower clay content, most often fits greenware and bisque ware). Few of these recipes encompassed all the characteristics I was looking for—something similar to commercial underglaze. Not too much to ask, right?

I started by choosing a clay and a flux. I needed a fairly heavy clay content for adhesion to the clay body, and an equal amount of flux to lower the melting point of the silica, and to create a hard surface. My clay choices included: EPK kaolin, calcined kaolin, OM-4 ball clay, and talc, all fairly white firing as to not add to the color, and each contributing something different to the adhesion needed. My fluxes consisted of: Ferro frits 3124, 3134, and 3195, a good place to start in terms of readily available frits. Then in a radical move, I ignored all previous instruction and treated the colorant as one of the base ingredients. This allowed for full incorporation of the color with the other two ingredients during the mixing of the base recipe. I used commercial stains in order to get an opaque quality (I later tested variations with oxides that resulted in a somewhat transparent underglaze.)

I mixed 1000 gram batches in a thousand variations (or something close to that). I actually mixed three batches of each recipe to testing gums and suspenders, without which, any substance mixed from the above ingredients would settle to a rock-hard mess and be nearly impossible to brush onto any clay surface. I tested CMC gum (powder, premixed into a liquid), premixed bentonite, and Sta Flo laundry starch (a tip from one of the internet recipes).

Not having the ability to replicate the colliodal process, I sieved and ball milled each recipe in order to fully integrate the raw materials into each other and to reduce the particle sizes as much as possible.

I tested each glaze on leather-hard, bone-dry, and bisqued earthenware and stoneware test tiles. I fired the earthenware tests to cone 04 and the stoneware tests to cone 6 and cone 10, all in an electric kiln.

After many firings and many eliminations, this recipe came very close to replicating commercial underglaze:

Holly's Underglaze

Cone 04–10

Ferro Frit 3124	33.3 %
EPK Kaolin	33.4
Commercial Stain	33.3
	100.0 %

Sieve all materials with an 80 mesh sieve and then ball mill for at least 12 hours. Incorporate Sta Flo Laundry Starch until the mixture reaches a thin yogurt consistency and sieve the entire mixture again.

Pros and Cons

The results were good, very good—smooth, creamy, good adherence, versatile at all temperatures, a hard surface, and an intense color. The substance worked well on both clay bodies and in all stages, but was best on bisque ware. Brushability was best with the Sta Flo. I found that too thick of an application caused flaking and pinholing. The lack of sieving and ball milling did the same. If mixed to the correct consistency, one coat was sufficient while two coats often was too much. The colors became muted when fired to cone 10 but still held up in hardness and adhesion. Only small batches could be mixed at a time due to the inclusion of the Sta Flo, which is organic and caused mold to grow in the bucket within a few days. The mold could be skimmed off but added unwanted lumps if it wasn't all removed. And of course the amount of commercial stain to produce the rich colors similar to commercial underglazes was ultimately very expensive. In the end, mixing this homemade underglaze was a lot of work for a product the manufacturers do just a bit better, faster, and cheaper. However, if I want colors that aren't available commercially, now I know how to make them. ■

9 Artists Using Colorful Underglazes

by David L. Gamble

***Teapots*, by Jim Kemp. Jim uses a low-fire red clay body and airbrushes underglazes onto the greenware. The last color he applies is black, which is sprayed across the piece to highlight the variations in heights of the surface decoration. The pieces are once fired to cone 02.**

Commercial underglazes are basically clay slips containing colorants, and they're a great way to add color to your work using a variety of application methods. And since they're formulated to have low drying shrinkage, they can be applied to bone-dry greenware or to bisque-fired surfaces. In addition to being able to change the surface color of your clay body, underglazes can also be used to change the texture of the body.

When used to add color to surfaces, underglazes have an advantage in that they are composed mostly of clay with very little flux, so they'll stay put and won't run, which makes them ideal for detailed decoration. While most underglazes were originally formulated for use at low-fire temperatures, most, maintain their color in the mid-range and some even as high as cone 9 or 10.

Simple Application

Underglazes can be applied by brushing, pouring, dipping, and spraying—anything goes. Each application method has different requirements. If an underglaze is too thick for spraying or using as a wash, just add water to thin it down. If it's too thin for silk screening or monoprinting, leave the container exposed to air to evaporate some of the liquid.

Underglazes work best with a clear overglaze, although other glazes of varying opacity and color may also be used. I've had success with whites and very light-colored glazes, but darker glazes seem to muddy or absorb the color of the underglaze. The overglaze can be anywhere from matt to glossy. You'll find the clear deepens the value of the colors regardless of application method. If you're sealing the surface of work that will come in contact with food, be sure to use a food-safe clear glaze that matches your underglaze's and clay body's firing range.

Applying an overglaze can be tricky. If you've applied underglazes on bisque, you'll find that they'll smear when brushing on a clear overglaze because wet glaze moistens the underglaze. Use a fan brush and float the first coat on without going over the same area twice. Wait for the first coat to dry completely before brushing on a second coat.

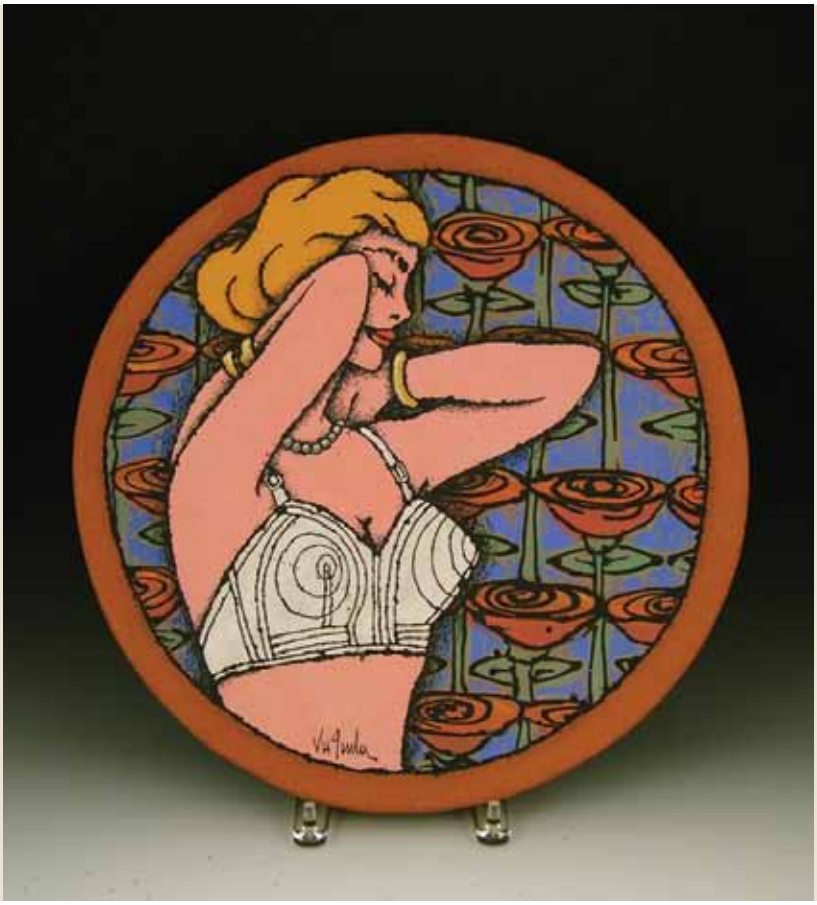
I've recently used underglazes to create a watercolor effect by thinning them down and painting them onto a semi-white glaze that is layered over another colored glaze underneath. The colored glaze (sometimes gloss, sometimes matt) melts through the white and gives it a richer off-white look. The clay body is a red terra cotta that can handle a number of multiple firings if needed. I've been creating pieces from my travel sketches to permanently document places I've traveled to in a sketchbook-like manner.

Testing the limits

Through their testing, clay artists have been very influential in the increased use and relabeling of under-

***3 Women Praying*, by Debra Fritts. Debra sculpts in terra-cotta clay and bisque fires to cone 02. She then covers the piece with black stain and then underglazes are applied, wiped, scraped, and fired to cone 04. She continues with final additions and does a final firing at cone 05.**

In this example from my *Sketch Book Travels*, series, I bisque fired a clay slab to cone 03 then layered base glazes—3 coats of key lime with white, and 3 coats of low-fire white on top. The sketch is then executed with thinned out underglaze washes and fired to cone 04.



Rimas VisGirda slab builds his plate forms from a terra cotta body. Following a pencil outline, he brushes on underglazes then applies wax to the entire surface. He redraws the figure and the outer border by scratching through the wax and into the clay surface and then inlays liquid black underglaze into the scratched lines. After bisque firing to cone 05, he waxes the figure portion and outer edge again but leaves the background alone. After sketching in flowers with a pencil, he applies underglazes to the flowers, leaves, and stems and further defines them with black underglaze. He applies wax over the flower stems and leaves then sponges blue underglaze onto the background. After firing to cone 5, he adds shading with an underglaze pencil then fire to cone 3.

glazes. When they successfully experimented with firing underglazes above the recommended cone 06 to a cone 5 with little or no change in color, manufacturers relabeled their products to reflect the change. The hobby industry also helped promote higher ranges by developing a line of cone 5 casting porcelain, meaning more potters were working at higher temperatures. Even though the majority of underglazes can survive a cone 5 firing, usually resulting in a more vitreous surface, always test before using them on your artwork.

Through the years, my friends and I have done many tests, taking underglazes to cone 10 in different atmospheres. Many of the underglazes change color and most become very vitreous, even glossy, without a clear glaze over top. I've even fired some underglazes at cone 11 and 12 with nice results.

At the University of Indianapolis, Dee Schaad mixed some of the new bright red and yellow underglazes into a cone 10 clear glaze in a ratio of three parts clear to 1 part liquid underglaze. He then brushed the mixture on top of various cone 10 reduction glazes, including a tenmoku, with great results—the bright colors stayed bright. When potters told me

Paul Wandless paints underglazes on plaster in reverse, painting the foreground first and the background last. He then pours a low-fire white slip on the plaster. This picks up the underglaze image and inlays it into the clay. After bisque firing to cone 02, he applies a thin clear glaze then glaze fires to cone 04.

Tom Meunick uses white stoneware or porcelain then bisque fires to cone 06. He then uses underglaze pencils to draw on the surface. After drawing, he atomizes it lightly with water then applies a glaze by dipping or spraying.

Steve Howell uses a body made from half porcelain and half raku clay. After the initial bisque firing, he adds underglazes and bisque fires again. Because a higher bisque absorbs less smoke, he bisque fires cool colors to cone 06 and warm colors to cone 04. After the bisque, he places the piece upside down in a 2×4-foot brick pit filled with sawdust layered with copper carbonate, salt, and bits of sticks and wood, then covered with a Kaowool blanket.

Ron Korczyski bisque fires a white low-fire clay to cone 04 then applies underglaze by brush on the bisque piece. He uses many underglaze colors in different size applicators that he can squirt out and draw line details and dots of color. The final piece is fired to cone 05.

Scott Rench silk screens the images he creates on his computer. Those images are screened onto the clay while they are still wet and can later be formed and shaped. After bisque firing to cone 04, Scott airbrushes a clear glaze and fires again to cone 04.

that the new bright reds that fire to cone 10 blush out to white, it made me wonder if mixing them in a clear glaze would help protect them from the salt when salt firing. Experimenting with all these colors allows you to find new and unexpected results when testing in, on, and under anything you have on the glaze shelf.

One thing to remember, however, is that if you're using underglazes at a higher temperature than recommended, things can change. One clay artist using a black underglaze at cone 10 noticed that the next pint she opened looked the same in the jar but had a very greenish cast when fired. The company told her they had to reformulate because of government regulations and material availability and reformulated the color to fit their cone 06 to 5 suggested firing temperatures. The higher cone 10 temperature was overlooked and not taken into consideration.

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