

# Lusters

by Johanna DeMaine

Lusters have been described as transmitting the same effect as the light reflected from a thin layer of oil on water. This diffraction of light is produced via the deposition of a very thin film of metal on a ceramic surface—be it glass, earthenware, or porcelain. Knowing what these materials are and how they behave is the key to making them work.

## Defining the Terms

**Aromatic Compounds:** Organic hydrocarbon chemicals, so called because many have a sweet smell, evaporate rapidly, and contain benzene rings. Typical aromatic compounds are benzene and toluene.

**Luster:** Extremely thin films of metals fired onto the surface of ware. The effect is due to the interference of incident and reflected light. Precious metal preparations and resinate lusters, in their unfired state, are complex mixtures of up to 40 components with different chemical and toxicological properties. Their toxic and ecological effects vary from product to product.

**Noble Metals:** As distinct from base metals, these metals do not corrode or oxidize in the presence of moist air or most acids. Most are precious due to their rarity in the earth's crust, and include gold, platinum, palladium, iridium, and silver.

**Organic Compound:** Any of a large class of chemical compounds in which one or more atoms of carbon are covalently bonded to atoms of other elements, most commonly hydrogen, oxygen, or nitrogen.

**Solution:** A homogeneous mixture of two or more substances, which may be solids, liquids, gases, or a combination of all.

**Suspensions:** A heterogeneous mixture of a fluid containing solid particles large enough that they will settle out if left long enough without agitation.

**Resinate:** A salt of an acid derived from resin.

**Polymer:** A polymer is a chemical compound or mixture of compounds consisting of repeating structural units created through a process of polymerization.

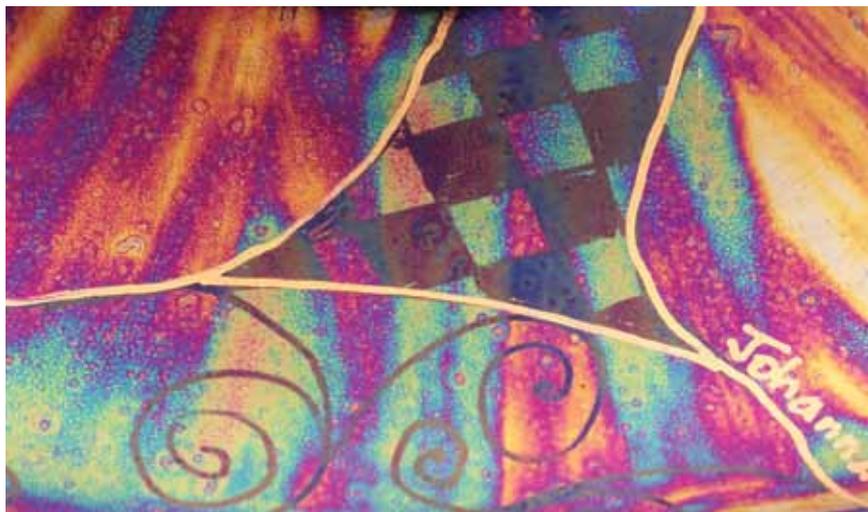
**Bismuth oxide:** An amphoteric oxide that acts as a flux in ceramic fusions. It is usually introduced in small amounts as a modifier of colorings and is a low-melting-point metal. The nitrate form dissolved in resin and oil deposits a mother-of-pearl luster on glazed ware and is also used as a carrier for other luster colors. The organic materials burn out at 1292°F–1472°F (700°C–800°C), below the melting point of metal.

## Reduced Lusters vs. Resinate Lusters

Lusters were first in evidence on glass in Egypt in the 4th century. By the 9th century, luster was being used on ceramics. Reduced luster—also known as pigment luster, smoked luster, Arabian or Persian luster—was first used in Iraq in the 9th Century. A pigment, based on an iron-bearing clay and containing copper or silver, is brushed onto a fired glaze surface and then refired in a reducing atmosphere. After firing the pigment/clay paste is washed off, leaving behind a thin film of metal, which we call luster. The interactions between the clay paste/pigment, temperature, length of reduction, and base glaze are all important. Most notably the base glaze has to accept and develop the luster from the pigment. The glaze can be either lead- or alkaline-based frits that are non-toxic and non-soluble. They are typically low-temperature glazes as the glaze needs to soften between 1112–1292 °F (600–700 °C) in order to bond with the thin film of metal deposited. Other sources of metallic deposition are possible with luster glazes, resinate lusters, and fuming. The widespread use of electric kilns, together with the increasing interest in and use of overglaze techniques necessitates a focus on resinate lusters.

Resinate lusters are made up of solutions and suspensions of metallic resinates in solutions of polymers and thickening agents to aid application by brush and machine. The colors result from metallic oxide films bonded onto the glazed surface by a flux, specifically bismuth oxide, which must be fired to a low temperature otherwise it would burn out. This is the same luster film as produced by *reduced luster*—the main difference being the method of application and firing technique employed. Whereas reduced lusters are either clay paste or water based and fired in a reducing atmosphere, resinate lusters are oil/resin based and are fired in an oxidizing atmosphere. The localized reduction is performed by the carbon produced from the resin (usually pine oil) base. Resinate lusters are a product of the ceramic industry, developed as glaze application and controlled firings were standardized for mass production. Resinate lusters are also known as *oxidation* or *commercial lusters*.

Lusters, then, can be redefined as precious-metal-based organic compounds dissolved in a solvent base and combined with resins. Gold and platinum lusters consist of precious-metal-containing organic compounds combined with other organo-metallic fluxes and resins.



Luster has the appearance of the light reflected from an oil slick on water. The diffraction of light on the ceramic surface is produced by the deposition of a very thin film of metal.

## Working with Resinate Luster

Luster takes on the surface qualities of the ware that it is applied to. On surfaces with gloss glazes, luster will be shiny, on matte glazes it will be satin matte, and on vitrified bisque it will be very matte. As the luster bonds at the softening temperatures of the substrata, there is a wide firing range, which encompasses glass, earthenware, bone China, stoneware, and hard and soft porcelain (this refers to the glaze types used). Lustres can be fired from 1202°F (650°C) for glass through to 1562°F (850°C) for hard-glazed porcelains.

Luster is oil based so that it will adhere to a glossy surface. However, the surface has to be scrupulously clean. Any grease, sweat, and oils from the skin, or lint or dust will repel the adhesion of the luster. The two most common methods used for cleaning the surface of the ware are wiping the surface with an alcohol impregnated cloth or using detergent and very hot water until the water sheets off the pot. It is then dried with a lint free cloth and no further skin contact with the pot is permitted.

### Application

When applied, all lustres appear brown and lacquer-like, with their color achieved in the firing process. In order to visualize the end result while working, a permanent color chart can be made for each glaze typically used (1). This is simply a test tile with luster brush strokes applied and labelled, that is fired, then the tile is turned 90 degrees, the brush strokes are repeated, and the tile is fired again. This provides a readout of one and two layers of luster plus many variations of colors when luster is applied over luster. Different color glazes will also influence the luster colors due to their transparent nature.

Lustres can be applied by brush, sponge, and stamping. Some people advocate airbrushing for certain effects, but I do not recommend this as lustres are based on organic solvents. German squirrel hair flat shaders, mainly No. 10 (the old  $\frac{3}{8}$  inch size) are used for brush application. Broad areas of luster are achieved by laying down the luster in long

quick strokes, taking care not to overlap drying areas as otherwise these would be more intense in color. If a very even surface is required, the brushed-on luster can be lightly padded or pounced with a small sponge or cotton ball wrapped in a square of silk held tight with a rubber band. This will even out the brush strokes but will also lighten the luster considerably as excess luster is pulled off. Multiple layers of luster, fired between each layer, can be used to intensify color responses.



Luster and resist applicators from top to bottom:  $\frac{1}{4}$ -inch German squirrel hair flat shader;  $\frac{3}{8}$ -inch, No. 10 German squirrel hair flat shader; Tjanting (batik pen) used for resist detail; Kemper Gold pen/fluid pen used for pen work/writing with luster and gold.



Other methods of application are pen work, flow technique, and dipping (2). The batik pen (commonly known as the Tjanting) is used solely for resist. The flow technique is achieved by putting a quantity of luster thinners on the surface and quickly adding drops of luster before manipulating the flow of the luster by positioning/angling the work, causing the luster to flow. A number of resists can be used for specific effects (see below). Other abstract surface effects can be achieved with random application of salt, dispersing agent, glass cleaners, mineral spirits, alcohol, as well as marbling fluid. Partial removal with crumpled plastic kitchen wrap, rubber stamps etc. can produce different textures.

### Brush Care

Keep luster brushes for luster use only, as other mediums will contaminate the brushes. To clean brushes, put a small amount of luster essence or citrus solvent into two small glass jars, and fill one jar with a small amount of methylated spirits (denatured alcohol). Swish the brush in the first bottle, blot it on a tissue, then swish it in the second bottle of luster essence, and blot it again. Swish it in the methylated spirits jar and blot it once again. Finally work a detergent into the bristles and rinse the brush exceedingly well under warm running water. Blot it on a tissue and dry it flat.

### Working with Resist

My preferred method of working is with resist so as to limit my exposure to luster. I spend a lot of time being precise with the resist, so that 90% of my time is spent in applying inert resist and only

10% in actually applying the luster. This reduces my exposure to the organic solvents in the luster.

Most resists, apart from waxes, will work as luster resist. Latex, white poster paint, adhesive tapes, masking lacquers, stickers, white-out pens, and proprietary luster resists can all be used. I prefer to use Fay Good's black luster resist as this resist can survive several firings without having to be cleaned off and reapplied.



Oval vessel, 8½ in. (22 cm) in height, wheel-thrown porcelain stoneware, glaze, fired to cone 10, multiple layers of luster and gold with hand-drawn resist patterning, multiple firings to cone 015, gold pen work. Collection of HRH Queen Elizabeth II. Photo: Errol Larkin.

I sketch my drawing onto the glazed surface with a non-permanent, black overhead-projection pen. I then go over this, adding detail with a Tjanting filled with the black luster resist that I have adjusted to flow through the tip. After the resist dries, I apply an even layer of luster in the areas required just the same as for any other painting technique. I then fire to 1472°F (800°C) in approximately 5 hours. I don't subscribe to the fast firing techniques because glaze softening takes time as well as temperature.

After the first firing, I continue adding layers of luster to deepen the color, firing between each layer. I add further resist to help the layering effect that I am after. After the final luster layering, I will either add pen work with a gold pen, or use raised enamel for accent. I remove the resist by gently cleaning the surface with liquid dish soap. Do not use any abrasive cleaners as they will scratch the surface.

## Toxicity and Safety

Finding out precisely which of the solvents have been utilized is not easily done, as there is a degree of secrecy within the industry. There are no safe organic solvents. These toxic substances are unstable, poisonous compounds and these toxins can enter the body through skin absorption, ingestion, and inhalation. Though some of the materials that produce these toxins are essential to the creation of ceramics, it is not necessary to stop working with them to remain healthy. However it does mean that a raised awareness and new work habits are essential. So it is best to assume the worst-case scenario. This must take into account the health risks associated with a high concentration of noxious fumes, their flammable nature as well as being irritants to eyes, skin, and respiratory tract. The noxious fumes are present during both application and firing.

Proper ventilation and safe work practices will prevent the inhalation of fumes. Be sure to use either dilution, local, and/or personal ventilation while working with resinate luster. Immediately remove any luster from the skin with methylated spirits or other alcohol and then wash the area with soap and water. Do not bite fingernails, put brushes into your mouth, eat, drink, or smoke while working with lusters. Do not bring food or drink into the decorating workplace. Noxious fumes are present in the firing of lusters as the media burns out. Do not enter a kiln shed/area/room without a respirator while firing lusters—this can be very damaging to the lungs. Under no circumstances should a kiln used to fire lusters be placed inside a dwelling.

*Lusters contain all or some of the following toxics in varying proportions (formulas vary per color): Turpentine, O-dichlorobenzene, Cyclohexanol, Cyclohexanone, Methyl cyclohexanol, Di-iso-octylphthalate, Camphor, White spirit, Xyleone, Tetrahydronaphthalene, Isophorone, Tetrahydrofurfuryl alcohol. Classifications for solvents used in commercial luster production: Aromatic hydrocarbons, Hydrocarbons with a low content of aromates, Hydrotreated aromatic hydrocarbons (tetraline), Alcohols and ketones (propanoles, butanoles, butanones, and diacetone alcohol), Terpenes (turpentine oil and etheric oils).*

*For a comprehensive account of Johanna DeMaine's approach to health and safety, read the article in conjunction with "Health and Safety and Overglaze" available at <http://overglaze.info>. Additional information, bibliography, and recommended reading at <http://johanna.demaine.org>.*