ENAMELLING OVER COPPER FUSED/ALLOYED IN SILVER

Submitted by

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AR 695 - Written Research Paper

In partial fulfillment of the requirements

for the Degree of Master of Fine Arts

Colorado State University

Fort Collins, Colorado

Fall 1988

The research project of fusing/alloying copper tubing into silver, then enamelling over the allow with transparent enamels came about as I was searching for a visual design that would not need multiple layering of enamels. This technique would be used in a piece of jewelry that requires lightness, it would have many other applications, of course limited only by your imagination.

Enamelling over Copper Fused/Alloyed in Silver

1. Project--To fuse/alloy copper tubing, sinking into silver and then enamelling over alloy.

2. Materials--Copper tubing, many sizes (diameters), and fine silver (I like to use fine silver because it produces less oxidation under enamels), past flux.

3. The size of available rolling mill is the first factor in determining the size of sheet silver used (My rolling mill is 3". I've chosen to use a 2 1/2" x 2" piece). To maintain the pattern, you may want to use a square piece. I recommend using 18 gauge or thicker and cut copper tubing to 1 1/2 x 18 guage and file edges smooth--why make tubing taller? You risk engulfing your tubing in silver and having to file much of your silver down to find the tubing. It may sink below the bottom of the silver and you may lose some of the copper in alloying.

4. Anneal silver.

5. Pickle copper (I find it easier to dip a small bowl into hot pickle and to put the little pieces of tubing into that--they may get lost in a large pickle pot). Pickling the silver is optional, since fine silver does not develop firescale to be cleaned off.

6. Transfer pickled metal to solution of boiling water and baking soda. Boil for 3 minutes.

7. Transfer copper tubing to cup of cold water (this prevents oxidation from air drying). Clean silver with pumice and scouring powder.

8. I use a charcoal soldering block (lay silver on top) paint top with paste flux. With tweezers, pick up a piece of tubing, dip in flux. Besure to dip each piece of tubing individually and place on silver; because of flux movement the tubing may not stay where you put it. With a soft flame, gently dry flux. You may need to separate the tubing because of the flux movement. Use a higher flame to heat silver and copper. Copper will sink down ito silver just before silver is completely molten. When all pieces are sunk in, close tank and immerse in pickle.

9. File fused copper down flat to silver surface, on both sides. It may be easier to do this on a curved surface.

10. Roll metal through mill. (If you have curved the surface to file, it may be necessary to anneal first.)

11. Anneal.

12. Roll the metal through mill again. Repeat this process; roll, anneal until metal is at the desired gauge--around 22 gauge.

13. Cut metal into small pieces for test pieces. A fused copper circle should be in each cut piece.

14. Scrub each piece clean, i.e., until water flows over surface in sheet form with no spotting. I use Commet cleanser for its slight abrasiveness. Ammonia will do. Rinse well.

15. On a clean sheet of paper, coat one side of metal with Klyre-fire and sift an even coat of transparent enamel over it. Lift piece by the edges, turn over, and place on a trivet. Spray on Klyre-fire and sift enamel over metal. Gently brush off any enamel that may have settled on the trivet.

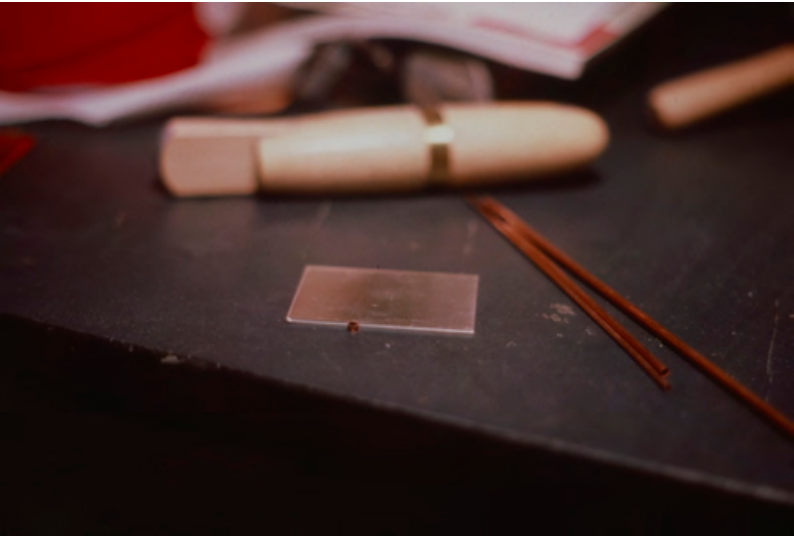
16. Set pieces aside in dust-free area to dry.

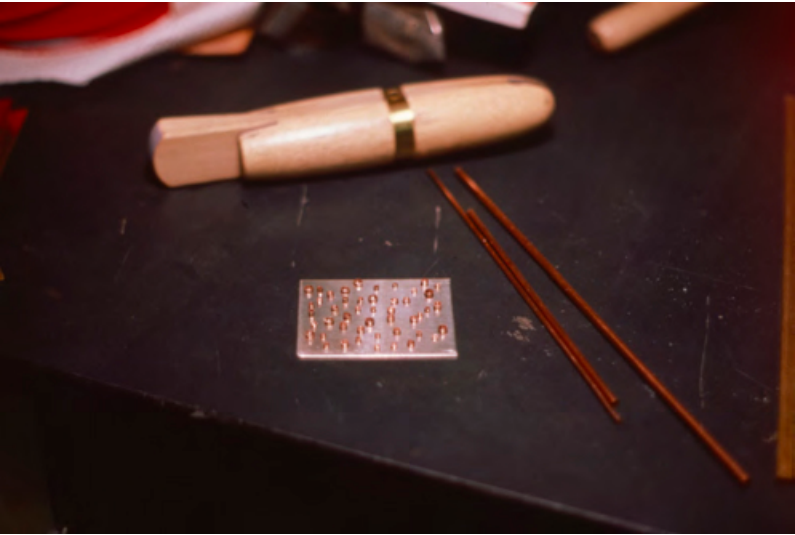
17. Fire.

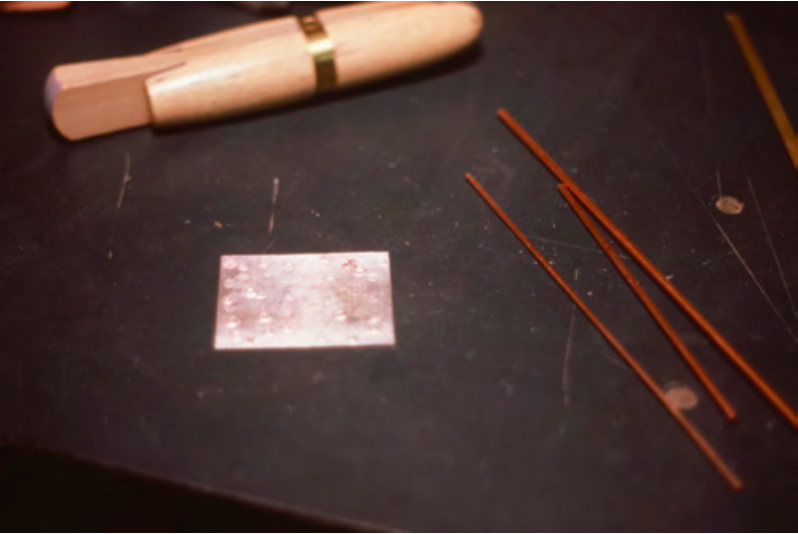
18. Allow to cool. The difference in metal color can now be observed under the transparent enamel.

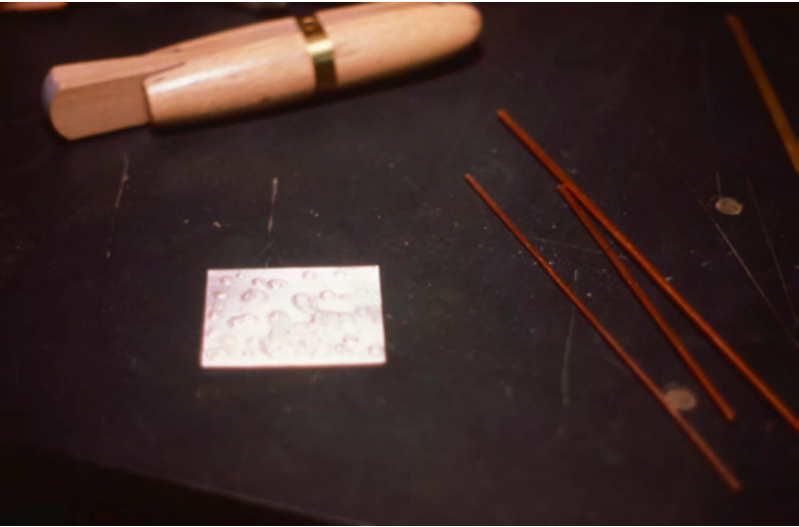
19. I have chosen the following Thompson leaded transparent enamel colors for my test pieces: Blue-jay #340, Sapphire #111, Aquamarine #200, Emerald #121, Palm green #997, Old silver grey #1013, Golden rod yellow #986, Amber #728, and Mikado orange #775.

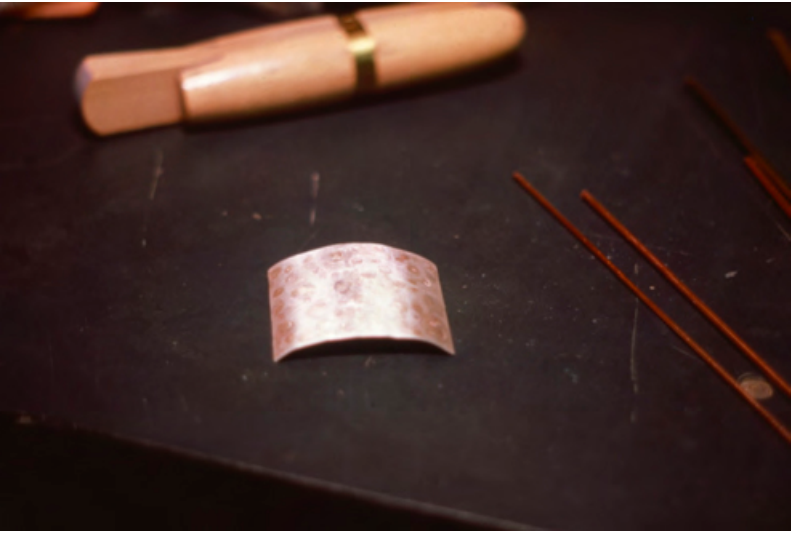
20. The Mikado orange I chose because I have had some success with it over sterling silver, but unfortunately, it did not react well with the fine silver, as with most reds. I had a lot of trouble with the yellow goldenrod as well. It pitted (air bubbles) around the copper and copper/silver alloy. The sapphire blue also posed a problem. Using Thompson enamel company figures, if the fusion flow is high, above 50 (at 1450 F) and the thermal expansion is high, above 270, coupled with the tension created with the new allow which has three thermal expansions instead of just one, it can create sinking of the tubing. The new allow also melts at a lower temperature than its singular components. This destabilizes the Sapphire so much that it cracked after successive firings. No other color as yet cracked in my experiments.

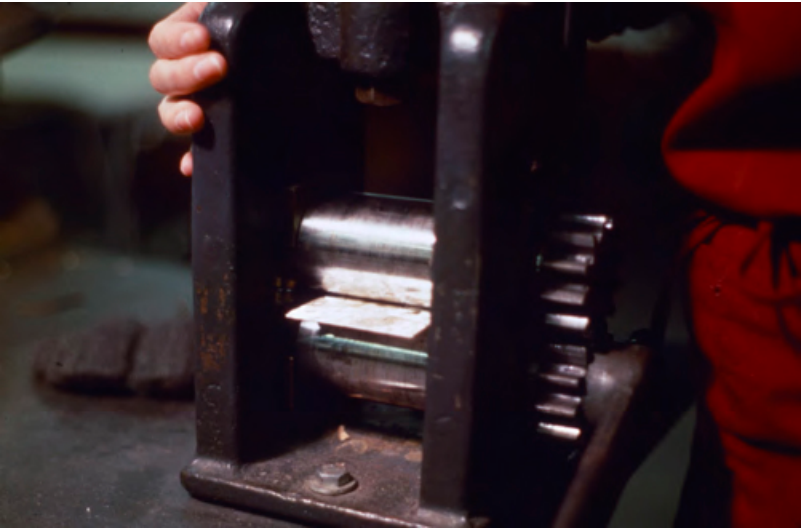


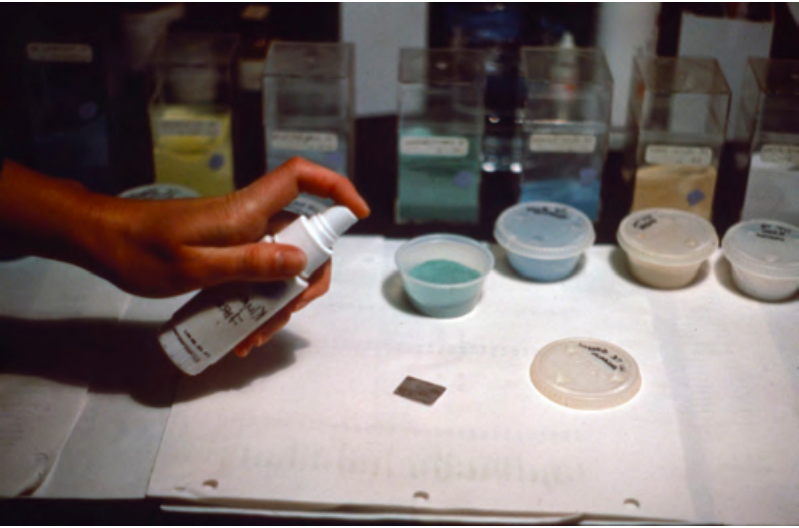


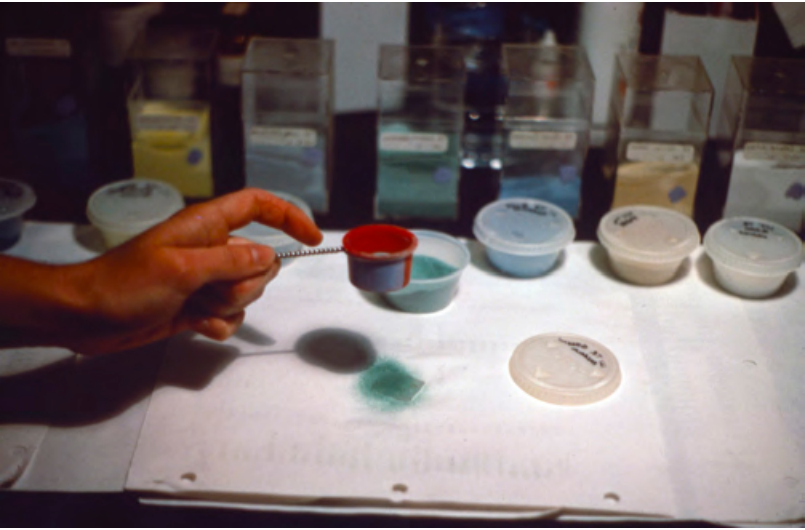


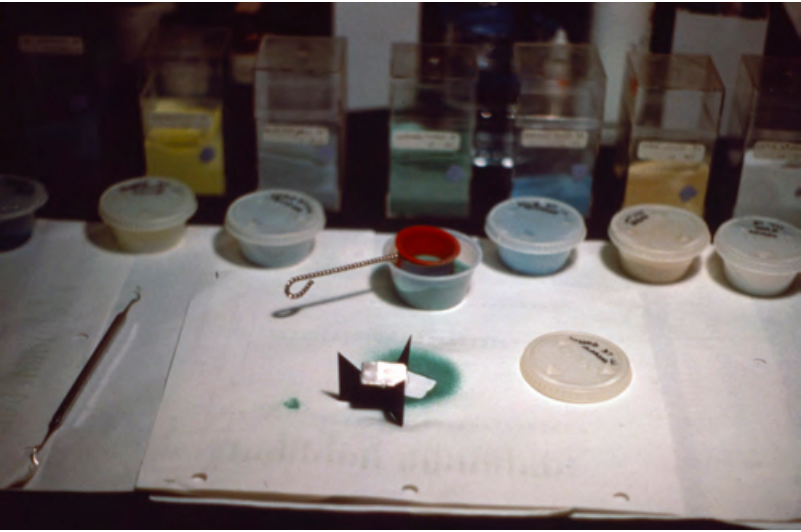


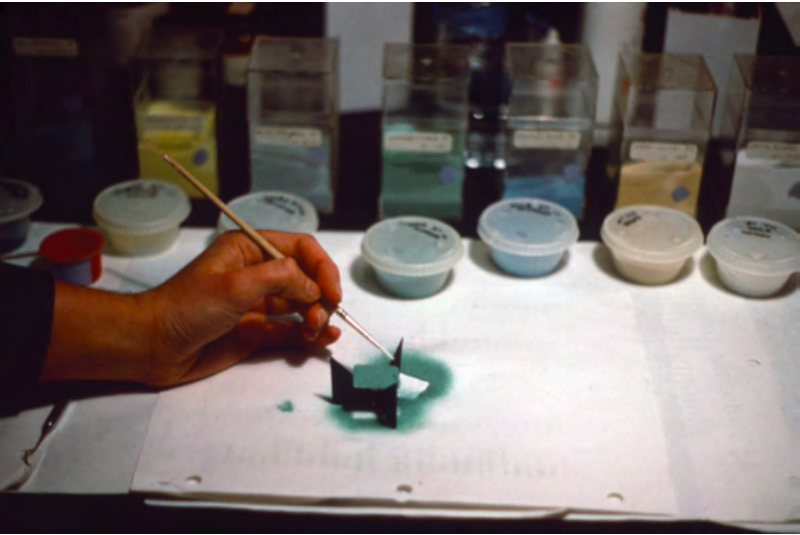


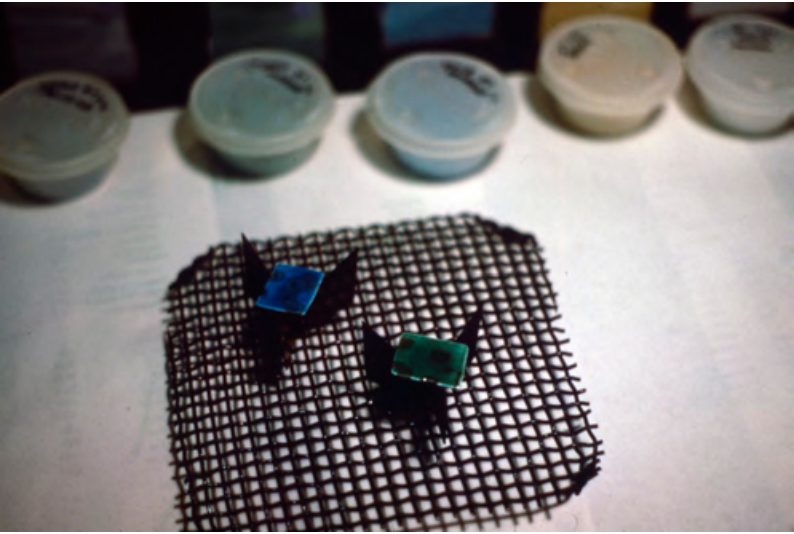


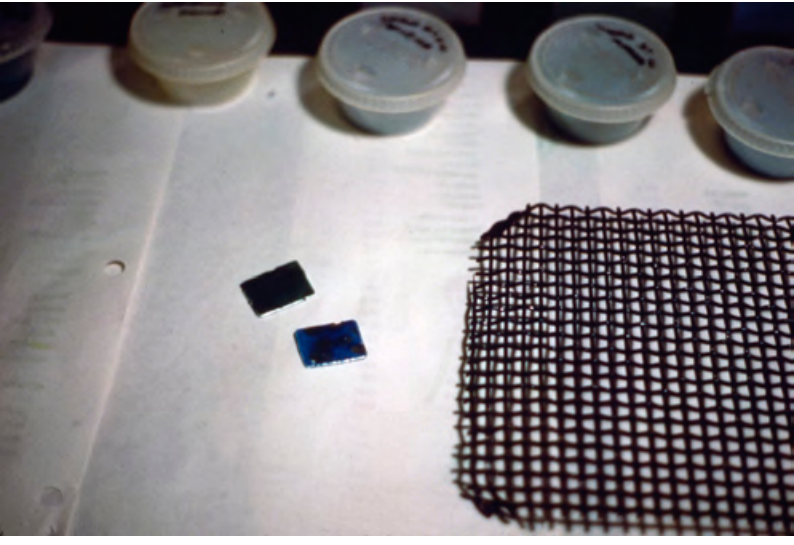


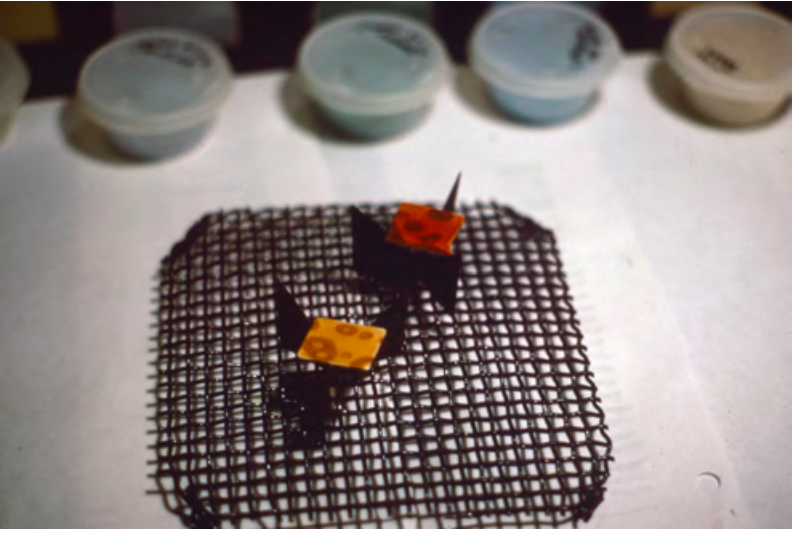


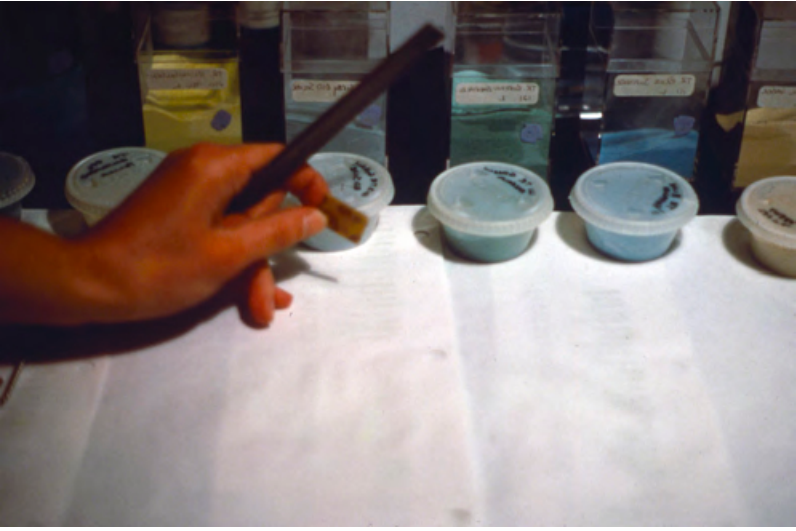


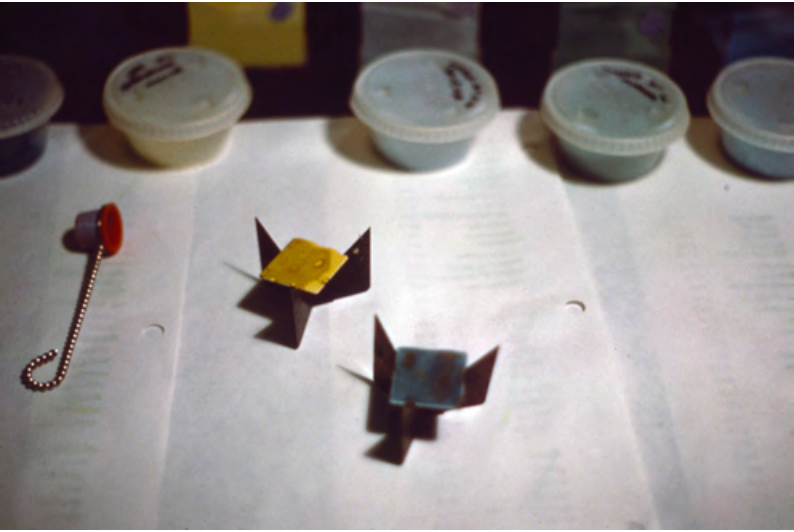


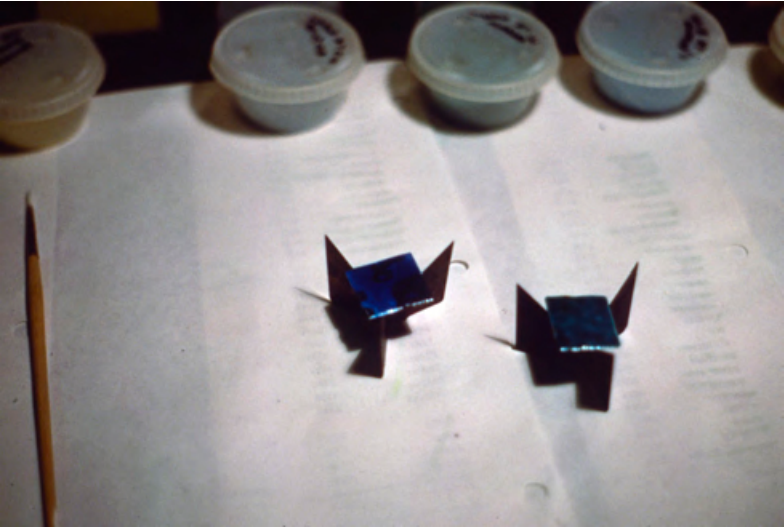












THOMPSON ENAMELS

#340-BLUE-TR.
BLUE JAY

#111-BLUE-TR.
SAPPHIRE

#200-TURQ.-TR.
AQUAMARINE

#121-GREEN-TR.
EMERALD

#997-GREEN-TR
PALM

#1013-GREY-TR.
OLD SILVER

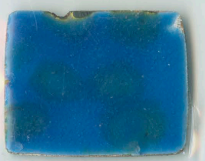
#986-YELLOW-TR
GOLDENROD

#728-YELLOW TR
AMBER

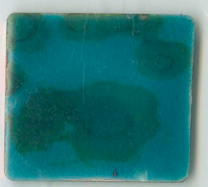
#755-ORANGE-TR
MIKADO

#340 - BLUE TR
BLUE-WAY

#111 - BLUE. TR.
SAPPHIRE



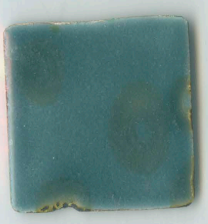
#200 - TURQ. TR
AQUAMARINE



#121 - GREEN, TR
EMERALD

#997 - GREEN, TR
PALM

#1013 - GREY, TR
OLD SILVER



#984 - YELLOW, TR
GOLDENROD

#728 - YELLOW, TR
AMBER

#755 - ORANG, TR.
MIKADO