Married Copper and Bronze

March 2014

Mixed Metal Jewelry in Metal Clay, *pp. 7-25, 31-48.*

"Married metals" means one continuous surface of metal composed of different metals – as opposed to a segmented surface, where there is a space separating one metal from another. If you look at the pieces below, in the piece on the right the copper and bronze are separated from each other by an empty space, whereas in the piece on the left they are actually touching. Married metal should not be confused with a gradient surface: in both married and gradient surface the transition from one color to another is seamless, but in gradient it is a gradual transition, whereas in married metals the transition is abrupt.

The pieces in all the projects on the pages mentioned at the top of the page are considered married metals. This has an immediate implication on the firing schedule that should be best used for these pieces:

> For married metal pieces consisitng of copper and bronze, mid-fire schedule is best.

The main reason for this is that at high temperature copper and bronze tend to alloy at their contact point and create a third metal, which is bronze-colored. As a result, the original pattern and proportions between the colors is lost. Examples of alloying of copper and bronze are shown in *Patterns of Color in Metal Clay*, p. 8.

What can we fire then at mid-fire schedule with the one-fire clays? The only clay which is both one-fire and mid-fire is Friendly Bronze. Friendly Copper, as well as Quick-fire Copper, are high-fire, but can sinter at a lower temperature as well. That leaves us with Friendly Copper only, since the new clays do not mix with the Quick-fire clays.

> Do not combine the new High-fire/Friendly clays with the old Quick-fire clays.

All these projects can be made with Friendly Copper and Friendly Bronze and fired as follows:

Brick kiln
Ramp at 1800°F/1000°C per hour to 1510°F/820°C
Hold for 2:00 hours.

Muffle kiln
Ramp at 1400°F/778°C per hour to 1560°F/850°C
Hold for 2:00 hours.

Cross out page 9. Use a round bowl instead of a square one. Pieces don't need to separated by much. With a round bowl there is no need to avoid the center of the box.

Theoretically, all these projects can be also made with combination of Friendly Copper and Low-shrinkage Steel *XT*, Champagne Bronze and Low-shrinkage Steel *XT,* or Dark Champagne Bronze and Low-shrinkage Steel *XT*. Since Low-shrinkage Steel *XT* does not sinter at mid-fire schedule, they will have to be fired at high-fire schedule. Steel does not tend to alloy as much with these metals so there is no risk of loosing the pattern and proportion between colors. However, steel will not react with Baldwin's Patina and the contrast will not be as sharp as between copper and bronze.

Additional updates:

Page 21, sidebar: Cross out. All Hadar's clays stick well to fired metal.

Repairing Cracks in Fired Clay

First fill the crack and dry. Then add extra clay until the crack disappears. Do not sand or the clay will come off ! It's better to grind off extra material after firing. If the crack shows before firing, it is most likely to show after firing.

P. 25, photo caption, p. 25, sidebar, p. 32, and sidebar, p. 37: Cross out. There is no need to fill hollow forms with carbon.

P. 38, sidebar: Cross out the sentence in italics. It's always best to design a bracelet in a way that allows you to add links if necessary.

What techniqes create married metal pieces 

Inlay – see Index, p. 128.

Onlay - See p. 43 (steps 8-9), p. 44 (steps 13-18), p. 47.

Mokume Gane – See the books *Patterns of Color in Metal Clay* and *Metal Clay Practice*.