

## **SOLDERING:**

Use the same considerations as if soldering sterling silver. Easy and Medium solders should be used.

## **ETCHING:**

Use all chemical solutions with proper ventilation, safety equipment and supervision.

Etching will open the surface for patination and provide some dimensional topography to the metal. Ferric chloride is the most effective mordant and etches the brass faster than the copper. It is available in diluted form(10%) from electronic supply stores.

Clear household ammonia used overnight is also an effective mordant. Submerge the work in an ample sized, lidded container. The copper will be etched. Sludge build-up can be removed with a bristle brush.

## **PATINATION:**

For best results clean the surface well with soap to remove all oily contamination. Prepare the surface by rubbing with fine pumice or No Name Patina Prep. Baldwin's Patina works well with these metals.

Warm the metal under running water and shake off the excess. Gently rub a small amount of the solution on the whole surface and rinse. Continue alternating application with rinsing until the color is achieved. Do not let the patina pool. The copper should darken to a deep aged brown.

Traditional liver of sulphur can be used as a very dilute solution and will color primarily the copper. Household clear ammonia or ammonia vapors may also be used to produce a soft brown on the copper. Time and handling will also provide chemicals to patina the metal.\*

## **\*NOTE:**

All patinas are temporary. The environment they live in will affect them in many ways. They will often respond to the chemistry of the wearer. Waxes and lacquers can be applied to help stabilize the colors but in themselves should be considered temporary fixes.



**Shining Wave Metals**

## **Data Sheet**

**Mokume-gane**

**Sterling Silver/Copper  
Copper/Brass**

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## MOKUME-GANE

Shining Wave Metal's mokume-gane (Japanese for wood grain metals) are specially formulated using contemporary metals. The diffusion bonded laminations are designed to provide for bold patterns and very strong bonds. No solder is used! At 24 ga. each layer is less than .001 inch thick.

### Sterling Silver/Copper

#### COMPOSITION:

Random, Raindrop- 21 layers + sterling back.  
Copper layers are approximately twice as thick as the sterling. Sterling backs are 1/3 to 1/5 the overall thickness.

Ladder - 27 layers & patterned on both sides.

Straight & Flat- 27 layers.

Rod - 19 layers.

Unbacked patterns have an approximate ratio of 1.6 sterling to 1 copper.

#### MELTING POINT:

1432°F (777°C).

#### ANNEALING:

Recommended annealing temperature is 1250°F/675°C. *Do not quench!* This material may be torch or kiln annealed. Soaking at the annealing temperature is not necessary. Protection from oxygen by coating with flux or annealing in a reducing atmosphere will reduce the amount of oxide formation on the silver and copper alloys. Pickle as needed, taking care not to leave in the pickle too long to prevent unwanted etching. Over annealing in frequency, time and temperature is not recommended as it can cause excessive grain growth and significantly weaken the metal.

#### FABRICATION OF FLAT SHEET/ROD:

**Hot working any sterling/copper mokume is not recommended and will void the warranty.** This mokume is easily formed by raising, cold forming, die striking and sawing. Anneal after a 40% - 50% reduction has been achieved. When developing a pattern be sure to allow for stock loss. A good rule is that one will need to start with at least double the thickness of the final sheet or item.

This mokume may be finished using standard jewelry finishing techniques. Heavy buffing is not recommended as this may smear the surface of the metal and muddy the pattern. Use abrasives and tools that cut rather than grind. If a rotary file tool is used, it is best to remove the tool marks with abrasive paper or water stones before buffing. A matte or finely textured surface will best show off the colors of the metals in the mokume. Sandblasting or glass beading can produce interesting results; experimentation is recommended.

Please see the following guide on twist patterning: <https://www.reactivemetals.com/downloads>

#### SOLDERING:

Use a solder that flows at a temperature lower than the melting point. Easy and medium silver solder are recommended.

#### ETCHING:

Use all chemical solutions with proper ventilation, safety equipment and supervision.

Etching will open the surface for patination and provide some dimensional topography to the metal. Our "Multi-Etch" used cold is an excellent etch. You may also use a 25% nitric acid solution. The silver will remain relatively untouched while the copper will be strongly etched. Take care not to over etch. Ferric chloride used either cold or warm is a safer mordant and is available in diluted form(10%) from electronic supply stores.

Clear household ammonia used overnight is also an effective mordant. Submerge the work in an ample sized, lidded container. The copper will be etched. Sludge build-up can be removed with a bristle brush.

#### PATINATION:

The copper will readily patina from handling. Prepare the surface with fine pumice or No Name Patina Prep. This mokume may be patinaed with Baldwin's patina, Rokusho and some commercial coloring products. Traditional liver of sulphur can be used as a very dilute solution. Yellow stains on the sterling areas may be difficult to remove selectively. Household clear ammonia or ammonia vapors may also be used to produce a soft brown on the copper.\*

### Copper/Brass

#### COMPOSITION:

50% yellow brass (10 layers), 50% copper by volume (11 layers).

#### MELTING POINT:

1700°F (926°C).

#### ANNEALING TEMPERATURE:

1300°F (704°C) for one minute. *Do not quench!* Pickle in 10% sulfuric acid or Sparex. NOTE: Etching may occur if Mokume is left in the pickle for extended periods.

#### FABRICATION:

This is a very strong lamination. Forming techniques used on traditional copper alloys may be applied with a slightly greater frequency of annealing. Reductions of greater than 50% between anneals is not recommended.

Please see the following guide on twist patterning: <https://www.reactivemetals.com/downloads>