

## Kum Boo on Argentium Sterling Silver © Cynthia Eid 2011



### Definition and history

Kum Boo is the Korean name for a technique for applying gold to silver. In the Korean language, it translates as “attached gold”. The technique has variations seen in Chinese and Japanese metalworks, as well as in Korea, and is also used to attach gold to iron, steel, and copper. It is possible to use the process to attach gold to colored gold alloys, palladium, and platinum.

### Spelling

Because Korean does not use our alphabet, there are other spellings, such as Keum-boo. I spell it as Kum Boo, because in a conversation with Komeila Okim, we decided that is closest to a phonetic spelling.

### How it Works

Gold attaches to fine silver in a diffusion bond, through heat and pressure. The heat source may be a torch, a lab hot plate, a kitchen hot plate, an ultralite kiln, or whatever heat source is available, to heat the metals to 650-850°F. Pressure is usually applied with steel, agate, or pyrex burnishers.

### Preparation of Silver

#### Step One: Cut, Solder, Texture.....the Silver

It is wise to start with a small piece, which is flat, or has a gently curved surface. In my experience, the gold bonds best to a surface with a shallow texture. A bit of “tooth” seems to give the metals a mechanical bond in addition to the bond of the atoms. Examples of what I find to be good textures to use include:

- Texture from a grinding stone or diamond-bur made with a flexible shaft
- Texture of sanding. I'd suggest 600 through 220 grit.
- Most roll printed textures work well. It is best if it is shallow.
- Shallowly etched surface
- Shallow embossing

If I want a deep texture or microfolding, I do the Kum Boo first.

#### Step Two: Depleting the Surface and Hardening

For gold to adhere, the surface must be clean, fine silver, free of copper, tarnish, dirt, and oils. Each silver alloy has unique advantages and disadvantages. It is simplest to use this technique with fine silver, but sterling silver is stronger than fine silver. In addition to strength, Argentium Sterling has advantages of lack of firescale and greater tarnish resistance.

To apply gold foil to sterling silver, it is necessary to deplete the copper from the surface, so that the gold will adhere to a fine silver surface. With traditional sterling silver, it is

usually necessary to heat and pickle the sterling about six times. For Argentium Sterling, it is generally adequate to heat and pickle twice.

It is preferable to do Kum Boo as the last step in making a piece, because:

- the metal may have already been heated and pickled during the fabrication process
- thinner foil can be used
- the gold may separate and/or bubble from additional processes.

I find it efficient to put Argentium Sterling through the hardening process prior to Kum Boo. This means that the metal will be stronger and stiffer than if it were not hardened, yet the gold/silver bond will be stronger than if I hardened the AS after doing the Kum Boo. The second advantage to hardening prior to Kum Boo is that the heating and pickling deplete the copper from the surface, and burn off any dirt or oil. The increased germanium oxide does not seem to hinder the bonding process; the germanium oxide produced by heating reduces tarnish. If there has been no annealing, soldering, or fusing, then I cool and pickle the AS once or twice during, as well as at the end of the heat-hardening process, to ensure that the surface will stay white while the foil is applied.

### **Preparation of Silver-Step Three: Baking Soda**

When I am sure that the AS will not tarnish when heated, I find it essential to scrub the surface with baking soda. Sometimes I wash my hands, and then scrub with my fingertips. Other times, I use a damp paper towel with the baking soda. In any case, this neutralization and slight abrasion of the metal surface seems to be an important step.

### **Preparation of Gold**

24K to 22K gold works well on Argentium Sterling. Gold leaf is too thin for Kum Boo unless multiple layers are applied---leaf is meant to be applied cold with an adhesive. Gold foil is thicker than leaf, and is commercially available in several thicknesses. The thinner the gold, the less expensive it is, but the thinner foils are also more tricky to handle.

I know artists who like to roll their own, thicker gold foil. Some people feel that it is more difficult to get a good bond with thick foil---opinions vary. Most people who roll their own foil start with thin commercial sheet. Annealing the foil must be done carefully, of course. I anneal the foil by marking it with a black Sharpie and heating gently until there is only a "ghost" of the pen mark. I pickle, scrub with baking soda (a very mild abrasive that also neutralizes the pickle), and dry the metal, then continue rolling. If the metal gets wavy, it is past time to anneal. After rolling the metal as thin as possible with the rolling mill, you can roll the foil thinner by placing it between two sheets of copper. I have used copper that was annealed, but not pickled; the black oxide prevents the gold from sticking to the copper. I think it would also work to oil the copper, but it would be imperative to be sure to remove all oil at the end, since oil prevents the Kum Boo bond. I have heard of people using paper instead of copper; it seems to me that the paper would impart a texture to the gold---which might be pleasing, or might be a problem. If you roll your own foil, be sure it is clean at the end---by annealing and pickling, and/or scrubbing with baking soda, and/or rinsing in alcohol.

### **Prepare the Work Space**

Taking the time to organize the workspace helps organize the mind, preventing problems later. Damp-wipe and dry your work area. A smooth surface that is heatproof--- such as glass, steel, or ceramic---is excellent. If you need to use paper to keep the workspace clean, have a plan for what to do if it catches fire. For instance, have an empty steel cook pot nearby that you could drop the flaming paper into. Of course, you already have a fire extinguisher and smoke alarm nearby, right? A fire blanket is great, and less messy than an extinguisher.

Make sure that the tools that you plant to use are clean and organized. Wash your hands.

## **Cutting the Gold Foil**

To keep the foil clean, AND to make it easier to handle, I place the foil inside heavy tracing paper. I wash my hands, cut and fold a piece of paper that is a bit too large, and put the foil inside, trying not to touch the foil. Then, I seal the other edges with tape.

I like manicure scissors for cutting foil shapes. I also have a collection of paper punches and scissors that cut wavy lines from a craft store.

I cut a lot of the shapes I want, letting them drop onto a piece of smooth cardboard. After every few cuts, I use clean tweezers to remove the paper from the cardboard, so that soon, I have a collection of gold foil shapes, ready to apply.

The little bits of gold that are scraps, or badly cut go into a labeled container----these are used to mend tears, etc. Someday, I may have enough to melt, and roll out into foil.

## **Placing the Gold Foil on the Silver**

Put the prepared silver on the work surface. If the piece is flat, you can place the bits of gold foil directly onto the dry silver. My work is rarely flat, so I find it helpful to use a solution of 50/50 Klyr Fire/distilled water to help keep the gold in position. Enamellists use Klyr Fire to hold enamels in position. Though it is said to burn off without leaving any residue, I use a 50/50 solution, since it seems to work as well as 100% Klyr Fire. I found that a weaker solution does not hold well. I have also heard of using a hide glue solution, and I imagine that there are other organic binders that enamellists use, that would also work.

If you work quickly, or there are few enough pieces, you can “paint” the entire surface of the silver with the binder solution, and then place the gold foil. Alternatively, you can wet an area, place the gold, wet the next area, etc. I usually use a clean pair of tweezers to handle the foil, but sometimes, I use the wet Klyr fire brush. Be sure that the metals have dried before beginning to burnish.

## **Supporting the Silver**

If you are working on a flat piece, and using a hot plate that has a flat surface, the silver can lay directly on the hot plate. If the hot plate has a heating coil, then you'll want to cover the coil with a piece of 20 or 22 gauge nugold or brass or steel. I don't like to use copper, because it can get a flaky black scale, which can dirty the silver or gold.

It is very useful to bend the corners of the hot plate cover into “legs”, and drill some holes to allow earring posts to drop through. This makes the earring much more stable to work on. I also use a ball peen hammer and a wooden depression to make concavities to support beads or other formed pieces.

## **Heat the Silver**

**Hot Plates:** For jewelry, my favorite heating tool is a lab hot plate. Though I have been successful for several years using \$10 hot plates, they are meant for cooking food in the range of 250-500°F, and are not made to sustain the temperatures needed for bonding gold to silver. Kum Boo works best in the range of 650-850°F, so it is difficult to work for very long on a hot plate meant for kitchen use.

When using a cooking hot plate, set the temperature to med-high or high. Recently, I invested in a laboratory hot plate, which is made for higher temperatures. The ceramic plates can go to higher temperatures than aluminum tops. I also like the fact that the ceramic top of the one that I bought is not so uncomfortably hot to work over. Be careful to choose one that has a high enough heat capacity. The best prices I have found (so far) are at <http://www.mcqueenlabs.com/stir/hot-plates.php> There is a 4”x4” one for \$139, a 7” x7” with digital temperature control, #HP131225Q for \$209 (free shipping) as well as others.

**Ultra-Lite kiln:** also called a Bee Hive Kiln. This simple kiln plugs into a 120V household outlet and goes straight to full power. These can be used for granulation, enameling, Keum-Boo and PMC. You can buy or make red brass inserts/covers to use it for Kum Boo. The cost is similar to that of a lab hot plate. Though I have friends that find this to be a nice multi-purpose tool, I am among the people who find that my home's outlets do not seem to provide ample power. It is important to note that using an extension cord reduces the power to the kiln, and thus, the temperature of the kiln. If your outlet supplies more than adequate power, you may wish to purchase the "Temperature Control Unit" to adjust the power from hi to low.

**Torches:** For hollowware, I have used a torch to heat the metal, applying the heat from the side that will not have kum boo, so that I don't accidentally melt the gold. One can heat jewelry with a torch by placing it on a wire-mesh support, so that it can be heated from below.

### **Judging the Temperature**

When using a cooking hot plate, set the temperature to med-high or high. Set the control on a digital hot plate to a temperature around 750°F. In either case, you may need to adjust up or down, according to your personal judgment.

A wood stove thermometer costs \$10-15, and is a pretty accurate temperature gauge.

Wood chars around 550°F, so I lean a bamboo chopstick against the coil cover and watch for it to char. When I see that, I know that the metal is nearing the temperature for bonding. Hold a piece of gold foil in place with a burnisher or tweezers-tip, and press the "belly" of a burnisher lightly in the middle of a piece of gold foil; if it makes the gold adhere to the silver, then you are at the correct temperature, and have "tacked" the first piece of gold.

### **Burnishing Tools**

Make sure that the surfaces of your burnishers are polished smooth. I prefer agate or glass burnishers, because they don't mar the metal as much as steel burnishers. If you use a steel burnisher, it is important to periodically cool it by dipping in cold water. Gold can stick to a hot steel burnisher. I have read that the gold won't stick to patinaed steel.

Choose a burnisher whose shape matches the surface of the metal. For instance, a large, broad burnisher is good for flat or domed silver; a small round tip can be good for getting into grooves. One friend told me that she used a glass brush to smooth gold foil into a reticulated texture.

### **Adhering The Gold Foil**

#### **Step 1: Tack**

Tack the center of each piece of gold foil, using one tool to hold the gold down, while lightly pressing the middle of each piece of gold foil with a burnisher.

#### **Step 2: Burnish**

When the gold pieces have all been tacked in place, you are ready to fully burnish each piece of gold, using circular motions, and gentle pressure. Avoid trapping air by working from the middle of the piece of gold outwards toward the edges. Be sure to go over all the edges of a gold shape before moving on to the next one. Let the metal air cool; do not quench it.

#### **Make Sure the Gold is Fully Adhered**

When the metal is cool, use magnification, such as an optivisor, to check that the gold foil is smoothly attached. Use the edge of a fingernail to check.

### **If You Solder, or do any other Work after Kum Boo**

Though it is safest to finish all fabrication before apply gold foil, it is not always feasible. If you need to solder or form the metal after doing Kum Boo, be sure to re-check the adhesion of the gold foil afterwards. The foil may bubble up if there is trapped air. Re-heating and re-burnishing can usually smooth these down. A large bubble may need to be poked with a pin, to allow the air to be released during re-burnishing.

### **Finishing**

Burnish marks can be removed with pumice or baking soda on a fingertip, cloth, or toothbrush. Pumice is more aggressive than baking soda. Though the satin finish of these powders creates good visual contrast between the gold and silver, you may prefer the shinier finish of a soft brass brush with soapy water. The silver can be patinaed after any of these finishes.

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### **Supply List for Kum Boo**

Gold foil

Thick tracing paper

Clean tweezers

Small sharp scissors

Baking soda

Klyr fyr, distilled water, and small container

Wooden chop stick and/or wood stove thermometer

Source of heat, such as a hot plate, capable of 800°F

Burnishers – agate, pyrex, and/or steel

### **Sources for the Information in this Handout:**

Celie Fago's book Keum Boo on Silver, Paulette Werger, Charles Lewton-Brain, Komelia Okim, and my personal experiences. I recommend classes with each of these artists.

❖ *I hope that you find these notes helpful. If you have any comments, corrections, or suggestions for additions to this handout, I would be most pleased to receive them.*

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