

Juan Carlos Caballero-Perez

## **Explorations in Bi-Metal**

Students will learn how to maximize the design potential of bi-metal (silver/copper or silver/gold) to create metal objects and jewelry. We will cover processes for fusing fine and sterling silver with copper for making bi-metal sheet. We will also explore various techniques, such as photo-resist etching and photo resist plating on copper and silver bi-metal for creative and decorative design opportunities. Utilizing the flex-shaft for carving and scoring gold/silver bi-metal sheet for patterning configurations to create patterns for design possibilities will be taught as well.

### STUDENT SUPPLY AND TOOLS LIST

1.5"x 1.5" Sterling silver and fine silver 10 gauge  
6"x 6" Copper sheet 30 gauge  
Copper wire 10-12 gauge for bass bars  
OPTIONAL: 2"x 2" Bi-metal (silver and gold) sheet 20 gauge

### TOOLS

#### Most items that you may have

Saw frame: fine saw blades 4/0; 3/0; 6/0  
Set of pliers: chain nose, cutter and round nose  
Plastic mallet  
Scissors  
Safety glasses  
Dust mask  
Brass brush  
Square ruler  
Files ½ round or flat and set of small files  
Flat ruler  
Sand paper  
Steel wool  
Steel fine Tweezers  
Metal scissors  
Flexible shaft & flex shaft attachments  
Small mandrills for carbide cutting wheels  
Head visor  
Setting burs (hart, round)  
Hard carbide slim cut-off wheels 7/8", 1' diameter and .030, 033 thickness  
Steel hart burs 45 degree angle one or two 6 to 7mm for scoring  
Rectifier for plating

Copper sulfate (Midas Electroforming solution)  
Ferric Chloride  
Distilled water one gallon  
Citrus acid  
Rubber or Nitrile gloves  
Paper coffee filters  
Funnel  
2 Plastic container 32 oz clean yogurt container  
Shallow pyrex or polypropylene or plastic container for acid etching  
PnP blue sheets 5-10  
Iron  
Paper towels  
Rolling mill  
Torch  
Anvil  
Pickle pot for cleaning oxidized metal  
Plastic

### **Sources to order tools and materials**

Any of the following vendors or another of your choice may be used:

Gesswein  
255 Hancock Ave.  
P.O. Box 3998  
Bridgeport, CN 06605  
1.800.243.4466

Allcraft  
135 West 29<sup>th</sup> street  
Suite # 205  
New York  
1.800.645-7124

Frei & Borel  
126 Second Street  
Oakland, CA 94607  
1.800.772.3456

Press n' Peel PCB Film  
(PnP Blue)  
<https://www.techniks.com>

### **Midas Electroforming solution**

<https://www.riogrande.com/product/midas-bright-copper-electroforming-solution/335074>

### **Gold-silver bimetal**

Reactive Metals Studio, Inc.  
101A Air Park Rd  
Cottonwood, AZ 86326  
1 800.876.3434  
[https://www.reactivemetals.com/?gclid=Cj0KCQiAmfmABhCHARIsACwPRADjz6fkLSnbT8c0gYjnsBQDzS1ap-cgKOgasOrTpFVJb7Hq1GB73LQaAq3aEALw\\_wcB](https://www.reactivemetals.com/?gclid=Cj0KCQiAmfmABhCHARIsACwPRADjz6fkLSnbT8c0gYjnsBQDzS1ap-cgKOgasOrTpFVJb7Hq1GB73LQaAq3aEALw_wcB)

### **Rectifier**

Amazon  
[https://www.amazon.com/s?k=rectifier+for+copper+electroforming&ref=nb\\_sb\\_noss](https://www.amazon.com/s?k=rectifier+for+copper+electroforming&ref=nb_sb_noss)