

Brazing Gold (Au) to Metal Surfaces

CAUTION:

- It is advisable to perform these types of processes under a well-ventilated chemical hood.
- Wear proper protection on hands, exposed tissue, eyes etc.
- Follow MSDS protocols for safety.

Bonding Au fiber onto Fe surfaces

Recommended Procedure:

Since we are looking at a final operating temperature of 700°C, the first and easiest thing to do would be to use the chosen alloy's corresponding flux material. In the following steps below, it will be necessary to apply a small amount of Au onto the steel surface with the assistance of a miniature lab torch.

Fe does have a natural affinity to Au, and so this should not be difficult to achieve.

It is always best to use the appropriate flux. If flux is not available, we recommend using an inert atmosphere instead, preferably Argon.

If a filler metal is to be considered, the following alloys are suggested:

Use an Au + Cu + Ag + Zn alloy (keep the Au at ~75% to maintain the higher temperature and also the density close to that of the Au coating in the fiber, in this case 19.3g/cm³. Always use the proper alloy with the corresponding flux for a superior result.

Recommendation for a successful process:

- Ensure the surfaces are clean of impurities.
- Use a filler alloy which has a lower temperature than either of the two metals being fused.
- Maintain a thin space for the alloy to be absorbed, if you choose a V-groove it is preferred to stay between 100 and 200µm for the space between them. This will yield a stronger bond.
- Use a ceramic tool to hold down your fixture and fiber, otherwise use a tool that has poor heat conduction.
- If you use an inert atmosphere, I recommend Ar it will not react at those temperatures where N₂ may react with some metals at elevated temperatures.
- Consider thermal expansion of the chosen metals when alloying, this may impact the bond strength when the heating/cooling cycles take place at a later time. Try to keep the expansion rates as close as possible.
- The chosen alloy metals should have a melting point below that of the parent metal, in this case Au.
- When brazing, heat the Fe surface first, then add the filler metal just before you introduce the fiber.
- If you use an H₂ O₂ torch, keep the tip of the flame ~ 2-5mm away from the brazing components.
- Allow to cool down slowly, and/or anneal properly if necessary.