

## Irogane: Japanese Alloy Basics

Alloys are melted mixtures of elemental metals such as copper, gold, silver, lead and tin. In the European tradition some of the alloys we are most familiar with are those of gold. A gold alloy has a specific amount of gold (9ct=37.5%, 18ct=58.5%) combined with other elements the most common of which are copper, silver, nickel and zinc. The combination changes the colour of the metal but also its physical properties such as hardness. Sterling silver is also an alloy. It contains not less than 92.5% silver and 7.5% other metals usually copper.

Japanese alloys are often binary(two metals), or tertiary(three), but can contain five or more metals. Metals are also used in their unalloyed, pure form, most often copper, silver and gold.

The two most esteemed Japanese alloys are shakudo and shibuichi. Shakudo is primarily copper with, most often, 3 to 6% gold but can be 10% or even more of gold. The gold content is varied to control the resulting shade of black-blue/black when treated in the traditional chemical bath.

Shibuichi is primarily copper and silver in varying proportions, again dependant on the colour desired. The silver percentage can range from 2% to 60% or more, but more often would fall in the 15 to 40% range. These percentages are not haphazard, but are calculated for a specific colour result based on centuries of experience.

Shibuichi patinated with the traditional Japanese niage technique offers a wide range of greys with some browns when using very low silver content. Pure gold and silver are not affected by the niage chemical patination so retain their natural raw colours.

The metal artist works her chosen alloys into a creation depending on her colour scheme. The alloys are incorporated using various inlay and overlay techniques and are further worked by carving, engraving, chasing and/or polishing.

After the final polishing, the last step is the revelation of the colours through the patination process, a specific chemical boiling bath. Each individual alloy reacts uniquely with this treatment, developing it's own colour. Small variations in the metal alloy percentages make subtle variations in the final colours.

The time taken to achieve desired patina varies with some colours taking less than 30mins and others requiring 10 hours in the boiling patination bath.

Source: Jim Kelso. <http://www.jimkelso.com/japanalloys.htm>

*My sincere thanks to Jim Kelso.*

*Jim Kelso is an amazing metal craftsman originally trained in European metal working techniques but now working primarily in the Japanese tradition. Jim's generosity and guidance have made my explorations in Japanese metal work possible.*