



SILVER BULLET

A special section
devoted to working with
today's favorite metal

Compiled by Shawna Kulpa and Tina Wojtkiello Snyder



EDITOR'S NOTE: Thanks to rising metals prices over the past few years, silver has garnered increased attention in the jewelry industry. Look around and you'll see silver in high-fashion looks and even in bridal jewelry. In light of silver's popularity, more and more jewelry makers seek to both overcome the metal's traditional challenges (such as its tendency to tarnish) and differentiate their silver lines.

In this special section, we'll take a look at two of the hottest silver topics in the jewelry-making community today: tarnish-resistant alloys and blackened silver. You'll find an exploration of special considerations when working with tarnish-resistant silver alloys versus standard sterling silver, a comprehensive chart comparing these alloys, and tips for blackening silver to achieve consistent, high-quality surface coatings.

If you're interested in stepping up your silver offerings, check out the information we've compiled here. From the looks of it, silver will continue to reign as one of the industry's more popular solutions to high metal prices—its "silver bullet," so to speak.



Jewelry (top to bottom) by: Julia Kay Taylor, Cynthia Eid, and Patricia Tschetter.



WHITE ON

What you need to know about working with tarnish-resistant silver alloys

BY TINA WOJTKIELO SNYDER

If you've been making jewelry with standard sterling silver for the whole of your career, switching to one of the tarnish-resistant alloys readily available in today's market should be a breeze. Working with a tarnish-resistant silver alloy isn't all that different from working with traditional sterling—but there are a few key points, some of which are alloy-specific, that you should be aware of when casting or fabricating.

Casting. Metal suppliers agree that casting tarnish-resistant silver alloys is very similar to casting traditional sterling silver. The main difference is in the appearance of the castings—they're white out of the flask because they do not develop firescale.

"Traditional sterling silver requires pickling to remove the heavy black oxide layer," says Jim Sivertsen, head of the technical department at United Precious Metal Refining (UPMR) in Alden, New York, which offers a line of tarnish-resistant silvers that includes Sterlium-Plus, Silvadium, and Sterling Super. "Tarnish-resistant silver castings come out so white that the most you'll have to do is water blast them and soak them in investment remover."

Sivertsen says that his customers, especially larger manufacturers, love this because it not only saves them the time required to pickle the castings, but also eliminates the need to dispose of the acid solution.

Charles Allenden, quality assurance manager of Argentium in London, which carries a line of tarnish-resistant Argentium silver alloys designed for specific uses, says that in addition to eliminating

the finishing costs associated with firescale removal, the bright white castings produced by tarnish-resistant silvers are ideal for stone-in-place product. "It's hard to clean behind the back of the stones to get that bright shiny finish required to let light reflect through them," he says. "This is a problem with standard sterling."



Ronda Coryell

Another benefit tarnish-resistant alloys offer to casters is a reduction in gas porosity, assuming the flasks were burned out properly. "Silver has a great affinity for oxygen and absorbs it quickly, which leads to porosity," says Sivertsen. "The alloy additions in tarnish-resistant silvers tend to get rid of some of that oxygen, resulting in better quality castings."

Stuller Inc. in Lafayette, Louisiana, reports positive feedback from many of its customers who have tried casting with



NOVELL DESIGN STUDIO/KEMP METAL PRODUCTS INC.

The lack of firescale on tarnish-resistant alloys is a benefit to small-scale jewelers and large manufacturers alike. One example of the latter can be seen in the recently launched "In Union" line from Novell Design Studio in Rahway, New Jersey, which features bonded precious metal bands designed and distributed through an exclusive manufacturing/marketing partnership with Kemp Metal Products Inc. in Westbury, New York. These bonded bands comprise an interior seamless blank of Argentium 935 bonded to an exterior seamless blank of 14k or 18k gold. Starting with an oxide-free surface on the silver component increases the strength of the bond, resulting in a higher-quality product.

Novell is touting the line as a precious metal alternative to "alternative" metals. "In Union enables the consumer to purchase a high-quality precious metal band with intrinsic value at a lower price point than an all-gold ring," says Bruce Pucciarello, CEO of Novell. "The gap analysis begs for a product from precious metal at this price point. Consumers won't find In Union in a retail store for \$280 and then online for \$13.95 like tungsten, titanium, cobalt, or ceramic jewelry product."

Sterlium-Plus, which the company distributes as raw materials and uses for casting all of its silver product offerings. “We’ve been tracking conversations on our Stuller forum in which customers are talking about how much they like Sterlium-Plus because it casts much brighter and they are not having the cracking issues they had in the past with standard sterling silver,” says Kurt Jagneaux, metal fabrication director for Stuller.

One alloy-specific difference among the tarnish-resistant silvers is the suggested casting temperature range. While the offerings from UPMR require a slightly higher temperature range than that used for traditional sterling, Argentium alloys and the tarnish-resistant formulations from ABI Precious Metals in Carson, California, require reduced temperatures. The difference is slight (about 50°F) for Argentium, but it can be far greater for ABI’s customizable alloys. “Our tarnish-resistant formulations are more forgiving, and we use various elements to target specific designs or casting equipment,” says Chuck Bennett, the company’s alloy developer. “Standard sterling uses a hot flask temperature, so if you have a design that would work better in an 850°F flask versus a 1,200°F flask, you can use a tarnish-resistant formulation and still get good fill, without the firescale or porosity issues.”

Fabrication. For the jeweler wielding a torch, the differences in working with tarnish-resistant alloys as opposed to standard sterling are largely alloy-specific. Argentium may take the most getting used to if you are accustomed to using sterling because the germanium addition changes the color of the alloy when it’s heated. “Instead of a bright red when torch annealing, you are looking for a much duller red,” says Allenden. “If you



STULLER INC.

In addition to casting all of its silver product in United Precious Metal Refining’s Sterlium-Plus, Stuller Inc. offers the material as mill products and casting grain to its customers. “Silver sales will continue to increase with the current gold market,” says Tammy Kidder, executive director, procurement & materials operations for Stuller. “Sure all tarnish-resistant silver will still tarnish over time, but this product gives the consumer a piece of jewelry they will have more value in for a longer period of time. The color is also much brighter than on standard sterling, which is appealing to the consumer.”

Kurt Jagneaux, metal fabrication director for Stuller, reports positive feedback from Stuller casting customers about Sterlium-Plus. “We’ve been tracking conversations on our Stuller forum in which customers are talking about how much they like Sterlium-Plus because it casts much brighter and they are not having the cracking issues they had in the past with standard sterling silver,” he says.

keep heating it until you get up to a cherry red, you will get almost to the melting point of the metal, causing it to become brittle and crack. You just need to re-train your eye to see that pale red—not bright red—is the annealing temperature for Argentium.”

In addition, Argentium retains heat longer than a standard sterling silver, so once you’ve heated it up, you need to wait until the red glow disappears before you quench; if you quench it right away the piece might crack. “The added benefit of delaying the quench is that you get a much more even heat treatment,” adds Allenden.

In terms of work-hardening, both Argentium and the tarnish-resistant alloys from UPMR tend to work harden slightly

faster than sterling. “Whereas you can push sterling to a 70 percent reduction before annealing, I would not recommend going beyond a 50 percent reduction between anneals for the tarnish-resistant alloys,” says Sivertsen. The same applies to Argentium, which Allenden says feels harder and a bit springier to work with than sterling.

The one area in which the tarnish-resistant alloys seem to vary quite a bit is in joining. Sivertsen suggests using regular silver solder and plenty of flux on UPMR’s alloys. “Tarnish-resistant silvers won’t show a heavy oxide when you are soldering, but they do form an invisible silicon dioxide layer that you have to cut through with flux to get the solder to flow,” he says.

At ABI, Bennett has designed special solders for use with the company's tarnish-resistant offerings. "Some traditional solders don't work well on these alloys, so we've made our own formulations specific to the alloy being soldered," he says.

And while you could solder Argentium, in many cases there is no need to because of its unique ability to fuse to itself and other metals. "Because it has a slightly wider melting range, you can heat it up to the bottom limit of that range and it will fuse," says Allenden. "People are taking small granules of gold and bonding them to Argentium, or fusing two sides of a ring together when resizing it. Ninety-nine percent of the time for these applications they are fusing Argentium to itself—eliminating the need for solder."

While they may have some variations in working characteristics, tarnish-resist-



TSCHETTER STUDIO

Intrigued by its promise of no firescale, Patricia Tschetter of Tschetter Studio in Dallas started using Argentium a few years ago, and has since become addicted to its fusing properties. "What is so wonderful about Argentium is that you can granulate 22k on Argentium or vice-versa and you don't need a kiln," she says, adding that she learned a lot about working with the alloy by watching Ronda Coryell's instructional DVDs. "All you need is a charcoal block and a Smith Torch and you can fuse it beautifully." The bracelet shown here is made of 22k gold and Argentium fused together using this method. "I pushed the limits of Argentium's fusing qualities in this bracelet, and I continue to be blown away by how easy it is to work with."

Visit mjasa.org later this month to see in detail how Tschetter put together this month's cover piece, The Bee Ring.



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THE TOUCH

At The Touch Inc. in Waltham, Massachusetts, switching from sterling silver to Sterlium-Plus solved a big tarnish problem that the company was having with a line of nautical jewelry. "The tarnish problems with this heavily textured line were proving a barrier to sales," says George Simpson, president of The Touch. "The retailers were buying the product and selling it well, but consumers would return a short time after with complaints about tarnishing. Since we've switched to Sterlium-Plus, we haven't been hearing those complaints. Because we don't rhodium plate our silver, going anti-tarnish has helped us tremendously in satisfying the end consumer."

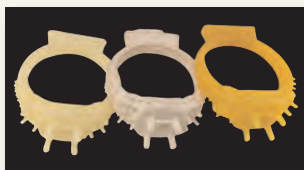
ant silver alloys share one common bond: They will all tarnish eventually. Just because they have additives that increase their tarnish resistance does not mean that they will never develop that black oxide layer, it will just take longer to form. To get a better idea of the specific tarnish resistance offered by the alloy you choose to work with, ask the metal supplier about the results of tarnish tests conducted on the alloy. Taking that data into consideration along with some of the process specifics when working with the alloys, you'll be able to make an informed decision about which tarnish-resistant silver alloy is best for your jewelry line. ♦

Visit [MJSAJournalOnline, mjsa.org](http://MJSAJournalOnline.mjsa.org), this month for an in-depth look behind the fabrication of our cover piece, Patricia Tschetter's The Bee Ring in Argentium.

Direct Investment Casting Just Got Easier.

EnvisionTEC is proud to introduce its newest innovative direct investment casting material, Easy Cast EC500 for use on the **Perfactory** and **AUREUS** jewelry model makers. With 30% faster build times and dramatically improved casting abilities, EC500 is the answer you have been waiting for to give you a competitive advantage in the jewelry manufacturing market. You can now produce up to 15 rings in 5.7 hours at 25 microns resolution compared to 8 hours with the earlier materials on the AUREUS. The EC500 material produces the highest resolution with the crispest detail without sacrificing **SPEED AND ACCURACY**. The new EC500 has a melting point of 250 degrees C, and zero ash content on complete burnout which makes it cast as easily as any injection wax pattern.

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Tarnish-Resistant Silver Alloys

| ALLOY | Argentium 935 Original | Argentium 935 Pro | Argentium 960 Pro | Argentium 960 Pure | Silvadium |
|--------------------------------------|--|--|---|---|--|
| GENERAL ALLOY COMPOSITION | 93.5% silver, copper, and germanium | 93.5% silver, copper, and germanium | 96% silver, copper, and germanium | 96% silver, copper, and germanium | 93% silver, 7% palladium, and germanium |
| SUITABLE FOR WHAT PROCESSES | Fabrication into sheet and wire products. Can also be used for investment casting. | Investment casting alloy | Investment casting alloy | Fabrication into sheet and wire products. Can also be used for investment casting. | Casting and fabrication |
| MELTING TEMPERATURE RANGE | Solidus 1,477°F (803°C); Liquidus 1,657°F (903°C) | Solidus 1,598°F (870°C); Liquidus 1,670°F (910°C) | Solidus 1,625°F (885°C); Liquidus 1,697°F (925°C) | Solidus 1,661°F (905°C); Liquidus 1,697°F (925°C) | 875°C to 910°C (1,607°F to 1,670°F) |
| COLOR | Very white with high reflectivity. CIE Lab color measurements: L*97.5, a*-0.3, b*2.5 Yellowness Index 5.7 | Very white with high reflectivity. CIE Lab color measurements: L*97.8, a*-0.3, b*2.7 Yellowness Index 6 | Very white with high reflectivity. CIE Lab color measurements: L*97.6, a*-0.2, b*2.2 Yellowness Index 5.2 | Very white with high reflectivity. CIE Lab color measurements: L*96, a*-0.3, b*2.6 Yellowness Index 5.9 | Metallic white |
| HARDNESS (AS-CAST) (HV) | 68 | 52 | 52 | 55 | 50 to 55 |
| HARDNESS (WORK-HARDENED) (HV) | 167 (70% reduction in area) | 154 (70% reduction in area) | 154 (70% reduction in area) | 180 (70% reduction in area) | 80 (cold rolled), 90 (aged) |
| AVAILABLE FORMS | Sheet, wire, tube, beads, findings, and casting grain | Casting grain | Casting grain | Sheet, wire, tube, beads, findings, and casting grain | Casting grain |
| SPECIAL FEATURES | Superior quality sterling silver alloy of high purity with exceptional brightness, reflectivity, color, and tarnish resistance. This alloy is easily fabricated for all silversmithing applications and can also be hardened by up to 30 HV from the as-cast hardness by simple heat treatment at 572°F (300°C) for 2 hours. | Superior quality sterling silver alloy of high purity with exceptional brightness, reflectivity, color, and tarnish resistance. When investment cast, this alloy shows excellent fluidity and very low porosity levels. This alloy can be hardened by up to 30 HV from the as-cast hardness by simple heat treatment at 572°F (300°C) for 2 hours. | Premium quality silver alloy of high purity with exceptional brightness, reflectivity, color, and tarnish resistance, which conforms to the U.K. Britannia standard. When investment cast, this alloy has good fluidity and very low porosity levels. This alloy is capable of being hardened by up to 30 HV from the as-cast hardness by simple heat treatment at 572°F (300°C) for 2 hours. | Premium quality silver alloy of high purity with exceptional brightness, reflectivity, color, and tarnish resistance, which conforms to the U.K. Britannia standard. This alloy is easily fabricated for all silversmithing applications and can also be hardened by up to 30 HV from the as-cast hardness by simple heat treatment at 572°F (300°C) for 2 hours. | High metal reusability, firescale-free, high fluidity for stone-in-place casting, white-gold-like appearance, age-hardenable, and superior tarnish resistance. |

SILVER ALLOY CONTACT INFORMATION

The data in this section was provided by the suppliers. For more information, contact the companies directly.

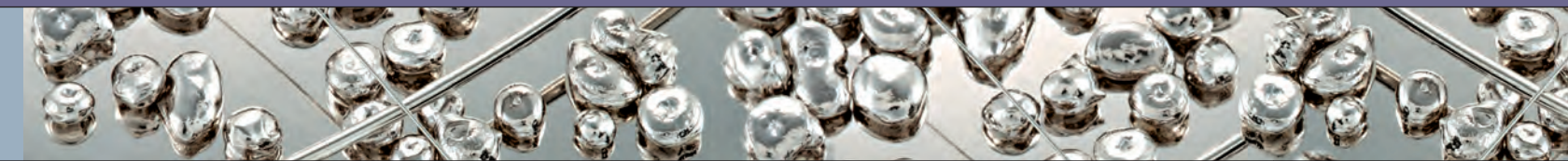
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| Sterling Super | Sterlium-Plus | TruSilver | Elite Silver (950-3P) | Sterilite Sterling #122 | Sterilite Sterling #250-B |
|---|---|---|--|--|--|
| 92.6% silver, 3.9% copper, 3% zinc, and 0.5% palladium | 93% silver, 4% zinc, 3% copper, and germanium | 92.5% silver, copper, and other metals | 95% silver available with additions of 1% palladium, 0.5% gold, and other proprietary elements | 92.5% silver, copper, tin, zinc, germanium, and silica | 92.5% silver, copper, tin, zinc, and silica |
| Casting and fabrication | Casting and fabrication | Available in two formulations: one for mill products and one for investment casting | Casting, stamping, and hand fabrication | Casting, stamping, and hand fabrication | Casting, stamping, and hand fabrication |
| 858°C to 905°C (1,576°F to 1,661°F) | 848°C to 901°C (1,558°F to 1,654°F) | 805°C to 875°C (1,481°F to 1,607°F) | 900°C to 945°C (1,652°F to 1,733°F) | 875°C to 910°C (1,607°F to 1,670°F) | 875°C to 925°C (1,607°F to 1,697°F) |
| Metallic white | Snow white | White | Bright white | Bright sterling white | Bright sterling white |
| 60 to 65 | 55 to 60 | 75 (mill alloy), 79 (casting alloy) | 94 | 60 | 89 |
| 92 (cold rolled), 102 (aged) | 90 (cold rolled), 120 (aged) | 150 (mill alloy) | 118 | 152 | 105 |
| Casting grain | Casting grain, sheet, wire, and tubing | Sheet, round wire, shaped wire, patterned wire, beaded and half-beaded wire, tubing, and casting grain | Casting grain and wire | Casting grain, sheet, and wire | Casting grain, sheet, and wire |
| High metal reusability, firescale-free, high fluidity for stone-in-place casting, steel white color, age-hardenable, and superior tarnish resistance. | High metal reusability, firescale-free, high fluidity for stone-in-place casting, improved hardness, age-hardenable, and superior tarnish resistance. | The alloys will be available in June. The mill alloy offers excellent rolling and drawing properties with high tarnish resistance. The casting alloy features excellent and forgiving casting properties with good flow characteristics and high tarnish resistance. Both alloys give an excellent polished finish. | Tarnish resistance similar to 10k gold, good casting properties, and a bright white finish. | Excellent casting properties, extremely bright out of investment with no firescale, bright white finish, good tarnish resistance, and excellent hand fabrication properties. | Excellent casting properties (high fill rate), no firescale, bright white finish, heat-treatable, and high tarnish resistance (five times that of sterling). |

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|--|--|---|---|---|---|
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