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**82% [Technic Inc. \[Providence, RI\]](#)**

Contact: Peter Ribbans Phones: (401) 781-6100 ( Chemistry ) / (401) 728-7081 ( Equipment ) Fax : (401) 781-2890

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3) Cast, nonmalleable, non-plated precious allows- (e.g Gold with Nickel not Palladium).

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**80%** [Titanium Tantalum Products Ltd \[Chennai, Tamilnadu, India\]](#)

Karthik Phone: +91-44-22781210 or +91-44-22780211 Fax: +91-44-22780209

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I periodically bail out the reservoir, pass the water through the SBA resin, and send it to cyanide destruct, and refill the drag out with rinse water.

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## Letter #

### Removing gold from electronics [New York]

Jan 4, 2003

I need help removing gold from electronics. I am using nitric acid, and I am getting a good amount of what looks like gold. I have unlimited access to old equipment, and I know if I can get some help I can recover a good amount of gold. I need to perfect the aqua regia process and I also want to try the reverse plating process. I also need to get advice on smelting the gold down to a button. Any help you can give me would be greatly appreciated. I am spending time and money on the trial and error method, and I know I have wasted some good gold. Silver, and other precious metals will be next after I get the art of gold recovery.

Thanks very much,

**Steven Esposito**  
- New York, USA

---

Jan 6, 2003

Contact a firm specializing in precious metals recovery and let them do it. I know of at least five. They have spent a lot of time and money figuring out the best way to squeeze the last ounce of gold out of a pound of scrap. There are a lot of environmental pitfalls with the use of acids to recover metals. If you are still set on doing it yourself, hire a consultant who knows what he/she is doing. The money you pay to find out the right way will be returned in process savings.



**Bill Vins**  
- Mesa, Arizona, USA

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Jan 21, 2003

I have alot of electronic and computer pins and contactsts that are gold plated I want to remove the gold from. Is there a low cost chemical ro something I can buy to remove the plating so I can melt it into bards. I have tried some circuitboard stripping solution called cbx from shorintertational but its very expensive and it dont work on copper based stuff.

**Jason Lawrence**

- Barre, Vermont, USA

---

Feb 24, 2003

Greetings:

I would like to ask some assistance regarding on gold refining. I am small entrepreneur would like to engage in gold refining but I don't have much knowledge how to do it. Could you please help me by sharing some detail process instructions on this matter excluding Aqua Regia. Thank you very much and more power.

**Ndrew George Tuaquel**

- Philippines

---

Feb 27, 2003

Is there a safe, simple, and inexpensive way to reclaim gold from a variety of plated pins and connectors used on circuit boards and electronic components? Someone suggested using nitric acid but I am unsure of the procedure to do this.

Thank you.

**Jim Nelson**

- Granite City, Illinois, USA

---

Mar 10, 2003

I need help on how to recover gold from electronics. Huge amount of my money have been spent on it. I have limited information as regard this because no refiner around in my country. Also, I need platinum refiners who are ready to buy my catalytic convertors.

**ADEYEMI EZEKIEL**

- IBADAN, OYO, NIGERIA

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Mar 11, 2003

Please be careful in stripping precious metals off of substances. The chemicals used are highly toxic. Have a precious metal reclaimer buy these things off of you and reclaim it for you. It will save you a great deal of time, money, and frustration. Elevated metal levels in your blood can be dangerous to your health.

**Cynthia Smith**

- Pottsville, PA

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Mar 16, 2003

What part of a computer board is gold in?

**Jerome Brewster**

- Tyner, KY

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Apr 6, 2003

How I can refine gold using the way of electricity or another way except of aqua regia way.

**Sossy Abdelhak**

- Lebanon

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Apr 7, 2003

There is not enough gold on a computer board to make it worthwhile doing, even if your time is worth nothing. Now very old telephone and electronic material is another story. A short answer from a site is not going to provide the amount of information that you need to properly recover gold. There are a couple of fairly good books on the subject. Hit the internet bookstores.

**James Watts**

- FL

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Apr 27, 2003

As I know, there are many tons of electronics part, gold edge connectors, etc., were sent to China for gold recovery. I also do not clearly know what type of procedure, heard that they are still using Aqua Regia to remove gold out and recovery by some special resin.

**Suvatn Srisanan, Mr.**

- Bangkok, Thailand

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May 30, 2003

I am planning to extract gold from the PCB scrap. So I have to strip gold electroplated on the PCB. Like other miner, we are going to use a NaCN solution to strip gold. Some months ago, I had a chance of watching a leaching work by using a NaCN solution in a certain plant. But they also have used a small amount of super strip 100 Shipley manufactured with NaCN. So I'd like to know the function of super strip 100 in a cyanide solution and suitable addition of it versus the amount of NaCN. To my knowledge, modern cyanide plants typically use a cyanide solution of 0.05% NaCN to dissolve gold from the ore. But in the case of leaching gold from the PCB scrap I think the lower concentration will be possible. If someone knows a appropriate concentration of NaCN solution to leach gold from the PCB scrap please let me know about it.

**Lim Sun Hee**

Daeryong enc - Shihungdong, Kumchungu, South Korea

---

Jun 10, 2003

I am interested in gold refining and would like to know of a few different sites to looking for purchasing gold refining - or more preferably a system for refining all semi-precious metals. I would like a machine to capability for processing around 10 oz/batch. Any information on where I can look, phone numbers, etc. would be greatly appreciated.

Thank you,

**Kymerlee Sellwood**

- Calgary, Alberta, Canada

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Jun 29, 2003

Hello,

I am a student of second year graduation. I would like to know wheather by putting acid(sulphuric,hydrochloricetc) on trashed computer components(cb's & the like) I would be able to isolate gold particles at small scale?

I would also like to know the richest sources of gold in a computer.

**Jai Trehan**

- Allahabad, Uttar pradesh, India

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Jun 30, 2003

Hello,

Like many other people on this site, I too am trying to get good information about recycling computer boards and other electronics for the gold, silver etc. I have good sources with a high volume on hand, so the supply side is taken care of. But I am really having a hard time locating good info. on the processing that is involved here! I would like very much to be able to grow this side line interest into a small venture. Any help out there would really be a HUGE help to me as I have not been able to find much on my own so far...

Thanks,

**Randall Hamby**

- Greer, South Carolina, U.S.A.

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Jul 3, 2003

YOU CAN STRIP THE GOLD BY REVERSE PLATING i.e., MAKING THE JOB AS ANODE IN AN ELECTROLYTIC SOLUTION OF 90%NaCN , 15%NaOH AND 15% SODIUM META NITRO BENZENE SULPHONATE, AND STAINLESSTEEL AS CATHODE. GOLD WILL DEPOSIT ON CATHODE. JUST PEEL OF THE GOLD AND REFINE IN ACID MIXTURE OF NITRIC OR SULPHURIC ACIDS, OR DISSOLVE IT AQUAREGIA, DILUTE THEN ADD SODIUM META BISULPHITE, PURE GOLD WILL PRECIPITATE AT THE BOTTOM.



**Panjala Mukesh**

- Hyderabad, Andhrapradesh, India

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Jul 17, 2003

Panjala Mukesh, what kind of material we need to put in anode? I mean what kind of metal. It is put the whole electronic board as an anode?

**Cheng**

- Ames, Iowa, US

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Jul 31, 2003

Would you please help me to recover gold from waste/scrap the complete process at home investing nominal amount?

**B.Yoganand Patnaik**

- Visakhapatnam, Andhrapradesh, India, India

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Aug 22, 2003

Dear Mr Panjula Mukesh from India,

Can you help me with your knowlege please, to construct an amateurs Lab at home in order to strip gold out of electronic equipment.

**Kitsos Dimitris**  
Hobby - Piraeus, Attica, Greece

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Sep 20, 2003

I want to find details about gold refining processing by addition of silver dowel weight of gold such as acid concentration, additive materials, or how identify of finishing process, etc.pleas tell me.

Thank you.

I am waiting for your answer.

Salam

**Farid**  
- Arak, Markazi, Iran

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Oct 10, 2003

I am trying to recover gold from small parts made mainly of gold coated steel, it contain also gold coated aluminium and brass pieces. When I treat theese parts whith aqua regia, the liqid is so muddy that I can not filter or continue the process to precipitate the gold. Do you have a solution to take off the steel prior to the normal process?

Thanks in advance.

**Joseph Oren**  
welding materials supplier - Givataim, Tel-Aviv, Israel

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Oct 18, 2003

Need info on reclaiming gold thru reverse plating what volt-age is used to reverse process could one use a small stainless container AS THE ANODE?

**Cathy Hubbard**  
telcom - Panama City, FL, USA

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Oct 19, 2003

You don't mention whether you are an industrial chemist working in a properly engineered lab, or a hobbieist who is likely to hurt themself, Cathy. If you are a hobbieist, sell your gold plated items to a jeweler; if there is a large volume of them, sell them to a refiner.

Remember that you can't plate or unplate gold except in an electrolyte strong enough to dissolve gold (like cyanide or aqua regia), Cathy. So, whether you can use stainless steel as the cathode (not the anode) depends on whether stainless steel is resistant to the electrolyte you choose. The voltage required depends on the conductivity of the electrolyte and the spacing between anode and cathode, but 6 volts is probably plenty. What electrolyte do you plan to use?



**Ted Mooney, P.E.**  
finishing.com Inc. - Brick, NJ

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Oct 19, 2003

I am looking for ways to dissolve precious metals from electronic scrap and then separate them from each other for purpose of recovery. Is there an alternative to using acids? If so how do I separate each metal so that I can smelt them in to ingot molds?

**Mike Brown**  
research - San Antonio, TX, USA

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Oct 23, 2003

Hi everyone , my company is doing recycle . We recycle about socket e.t. contact finger , socket , contractor . We coated the socket with a chemical ( PDR ) a layer of wax that provide more conductive and prevent it from losing the layer of gold plating on top when contact . ( in the socket pin it contain a layer of alloy , iron and gold) .We are finding a solution how to extract the gold out from it without other froms together , and insect it back to the socket pin again . Can anyone tell me the solution in doing it , I will be grateful to him/her .

**Chin Wing Wah**  
Recycle - Singapore

---

Nov 1, 2003

To Joseph Oren.

Add Sodium Bisulfite to precipitate the gold out of solution. Pour off solution. Add borax to the black mud, melt with torch, y voila.

**George Bernard**  
- Yreka, CA, USA

---

Nov 9, 2003

I have access to aircraft vanes and other aircraft parts proposed to be contain gold brazing. Anyone with suggestions on testing and recovery / refining of this gold?

**Tim Cooper**  
Gold Recovery / Refining - Decatur, Alabama, USA

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Jan 12, 2004

My goal is to recover gold from computer scrap. I separated the gold with nitric acid, but a grayish sludge, insoluble in nitric, comes off as well. I dissolved the whole mess in aqua regia, and precipitated with sulfur dioxide without first boiling out the nitric acid. I got a black



precipitate, unlike the brown I've seen reducing gold chloride in HCl solution. When settled, the precipitate had a blackish brown color. What impurity am I dealing with here, and how can I get rid of it, or am I just seeing very fine gold particles? Will it help if I boil out the nitric from the hydrochloric in the aqua regia solution before I start the reduction with sulfur dioxide?

**Douglas Drake**

hobbyist - Germantown, Maryland, USA

---

Jan 12, 2004

Aqua regia ... sulfur dioxide .... boiling nitric acid.... hydrochloric acid ... hobbyist. I just hope you're doing this in a properly equipped and fully permitted laboratory :-)



**Ted Mooney, P.E.**

finishing.com Inc. - Brick, NJ

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Jan 25, 2004

Hello, if using Aqua Regia to process your gold plated computer parts first process your gold plated parts in the Aqua Regia, after process stops pour liquid thru a coffee filter into a 1 gallon pickle jar, when jar is a quarter full of filtered Aqua Regia slowly pour in hot distilled water until half full, then mix a quarter pound of urea 46-0-0 into a quart of hot water and slowly pour into the pickle jar, the acid will boil up so take care and add slowly, when the fizz stops add another ounce of the urea 46-0-0 and stir, if no more fizz you may now add your sodium metabisulfite to drop out your gold, remember to save your filters for re processing and run your material 2 times, never process a large amount of base metal plated with gold, mix your batches like fingers chips and then pins 50% 30% 20% be very careful!!! Aqua Regia can burn or kill you if not respected!!!! I would read about it first or talk to a refiner.

**Arnold Hoskins**

Gold/Platinum, refining - Hamilton, Ohio, U.S.A

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Jan 28, 2004

I am an entry electrical engineer that has an interest in gold refining computer parts. I read a lot of the comments posted about the subject. I know that the card contacts are plated with gold, but is the Printed Circuit board valuable as well. Can someone please tell me all the valuable parts of a computer? And is it worth the trouble of collecting a lot of these pieces?

**Mike Sanders**

hobbyist - Philadelphia, PA, USA

---

Jan 29, 2004

There is nothing of value to a hobbyist/refiner except the gold which is yellow in color and obvious. It's thickness is perhaps 10 millionths of an inch. Do a volumetric calculation and decide if you are just wasting time.



**Ted Mooney, P.E.**

finishing.com Inc. - Brick, NJ

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Feb 8, 2004

I want to know about recovery of gold from pcb and other electronic wastes. I have very less of knowledge abt it and there are very few

players in this field.

**Abhishek Jain**

student - Udaipur, Rajasthan, India

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Feb 9, 2003

Few is relative. It seems like every 2nd hobbyist has decided that recovery of gold from electronics is a road to riches.



**Ted Mooney, P.E.**

finishing.com Inc. - Brick, NJ

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Feb 14, 2004

I am a scrap metal dealer and have gotten into recovering and melting aluminum, lead and lead/antimony, brass, copper, and bronze. I am also a machinist at a farm equipment manufacturer. I am looking at expanding what I can redirect away from the landfills such as wood waste, and E-Waste. What I would like to know is how to remove all the chips from circuit boards and then recover the gold from them. Do all boards have gold?

Thanx in advance,

**Brent Stumph**

Recycler/hobby caster - Yorkton, Saskatchewan , Canada

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Feb 28, 2004

Hello, I am going to have to agree with some of the things that have been said in this post in reference to the "hobbyist" and chemicals and the inherent danger involved in these processes. That said, it can be economically viable to process SOME electronic scrap utilizing a variety of different methods. In answer to questions relative to the quantities and types of recyclable materials from electronic scrap:

One ton (2000lbs) of "average" circuit board from modern computers and electronics generally yields (in a very good system) between 8 and 11 troy ounces of 24k gold. This gold is found in a number of places, including the plated gold leads referred to earlier, on plated pins inside the connectors and on the board in a number of places and on and within the ic (integrated circuits) on the board itself. In addition, there will generally be around 10 to 20 times this amount in silver from the solder and other components (although depending upon the method of recovery, this yield may not be reached). Some types of electronic board have greater yields of silver and almost no gold; this is generally the board without connector ends and major ics. There are also minut amounts of palladium, platinum and other pgms (mostly in certain capacitors, but also in some chips and connectors). Your highest yields of gold in computer scrap especially are rarely from clipped plated leads, but from the processor/cpu, memory and other ics (which can yield 2gm/lb or more, depending upon the type and age). Many of the older electronics and early computer equipment will be much much higher in volume, while the newest (97 and newer) I would surmise would be lower, although I have not processed enough to tell you for sure. There are, of course, many other places (like automotive catalytic converters) where you can find precious metals that may be recycled, but the scope of this section seems to be on electronic board/PCB so I will stay on that subject.

There are several ways to process these materials. Personally, I have used an electrolytic method utilizing cyanide leaching and Aqua Regia methods with success. I am still relatively new to the electrolytic method and have been using some cyanide alternatives recently, but with varying success and without much yield in silver. With Aqua Regia processing, you are able to process out each material by selectively precipitating from solution after absorbing in the acid. AR is a mixture of nitric acid and hydrochloric acid; it may also be manufactured using sodium nitrate (nitrate of soda available as a fertilizer) and muriatic acid (used as a concrete cleaner among other things). I first burn the materials, then crush them and dissolve in the acid and then let settle, filter, precipitate and then refine my metals. THIS IS DANGEROUS. DO NOT DO IT UNLESS YOU HAVE SOME KNOWLEDGE OF CHEMISTRY, UNDERSTAND THE DANGERS AND HAVE THE FACILITIES. Certainly, never try this in a confined area or around open flame AND DON'T GET ANY OF IT ON YOU and don't breathe the fumes. Also, you have to be careful about how you get rid of the afterproducts. If you really want to get into that, you can check out some

info at shor.com's website and there are other resources as well if you do a search on the net. For most of you, THE DANGERS WILL GREATLY OUTWAY THE BENEFIT if you don't have SIGNIFICANT KNOWLEDGE and quite a bit of common sense. A little bit of AR on you (or fumes in your lungs) and you will wish you had never heard of gold (or at least that you had taken your stuff to a refiner). That is, of course, if you have any wishes left. Because I don't believe most of the posters here are fully ready for this process, I have purposely left out the details on how to mix the chems, but I wanted to point out that there are significant quantities of precious content in these items and that it can be economically viable. So, for most of you, you will want to sell your whole populated computer board to a recycler or, if you have large quantities, think about a refinery.

Currently, 486 and older processors should bring at least a buck each, pentium and newer scrap processors at least .65 each, assorted clean plated pins 15.00 and up per lb, clipped plated connectors at least 12.00/lb. Whole pcb (not clipped or cleaned of pins) should bring at least .60/lb. These are prices selling to a reputable recycler, who will take bulk to a refiner. You won't get the maximum profit this way, but it is safe and pretty easy. If you go to a refinery, you should get higher returns, but bear in mind that there are additional costs and really check out the refinery you will use. In order to make it worth while at a refinery, you should have at least a couple of tons of material (10-15,000 lbs would be best) and you will be expected to provide transportation of the materials to the refinery and, generally, pay between .10 and .50/lb for the refining expenses. The refinery will do an assay or assays of your scrap and will pay you out based on those assays, so your materials should be sorted by the type of material to maximize your profits. Generally, you will be paid for between 90 and 97% of the gold, silver and maybe platinum/palladium depending on the refinery, based on the assay. You have to look for a good refinery, as many are less scrupulous than others. I have found that a refinery usually pays me out based on about 90% of what I would have been able to recover had I done it myself. I figure this is probably due to filter loss and a variety of other factors and not due to their being inherently dishonest, but you should keep these numbers in mind when figuring out what is the best method for you.

One more note on the automotive cats, there are a ton of buyers for these and, if you have 20, 30 or more, they will come to your door and pay cash. Prices range from 4 or 5 bucks for an aftermarket to 50, 60 or more each for certain imports, with an average of around 20.00 for most types. Pre-converters have pgms too, so don't forget about them.

Other types of gold plated materials (like jewelry, old medals, and many others) vary greatly in their yield, but most have some value. Gold filled materials can be a great profit maker too if you can pick them up cheap.

Okay, so that is my little bit of info. on this area of interest. Like I said, processing yourself can be dangerous; I hope I haven't made too many of you want to go that route, as it is easier and can be just as profitable to use recyclers and refineries (you have more time and less expense). If you have any questions, excepting exact methodology for processing yourself (as I don't intend to help anyone hurt themselves), I will try to help.

**Richard Alcorn**  
Research - Roland, OK, US

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Feb 28, 2004

Thank you, Richard, that was quite an exposition.



**Ted Mooney, P.E.**  
finishing.com Inc. - Brick, NJ

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Mar 1, 2004

Hello,

Hey I have a follow up question. I have found an amazing source for plated gold PCBs and was wondering how I should separate them before I bring them to the refinery? Also I was trying to put metal plated copper in a bowl and torch them but all I get is black 'slag' for less of a better word. Is this worth anything?

**Peter Couture**  
- Freeport, ME, USA

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## Letter #

### Reverse electroplating for gold recovery

Dec 28, 2001

I am about to embark on scrap circuit board recycling, primarily for the gold and platinum content. I am about to set myself up with an acid solution[aqua regia], that dissolves the precious metals, but is very dangerous to handle. It was recently brought to my attention that i could use a rectifier and salt solution to dissolve the metals , where a ceramic cell of some kind in the vat prevents the gold from transferring itself , and remains suspended until another chemical is added which causes the gold or platinum to solidify and sink to the bottom. I would appreciate some help , as i would like to avoid the messy dangerous route.

Thanks

**Allan Chiasson**

Mario's Metals - Bathurst N,B. Canada

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Jan 7, 2002

Recycling gold plated circuit board scrap is not a simple process that can be set up using only e-mail/bulletin board responses.

Hire a reputable consultant who can spend the time showing you processes that will:

1. recover the metals
2. be economical to operate
3. be safe for the operators
4. not violate environmental regulations

You will find that aqua regia or chloride-based electrowinning/refining are not going to work on "raw" scrap.



**Bill Vins**

- Mesa, Arizona, USA

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May 7, 2003

the apparatus you are thinking of, is the [simplicity refiner from Shor](#) , I have one at home and use it to refine karat gold. The alloy is dissolved into a saltwater solution by using either a rectifier or battery charger (12v 10 amp+) then the gold is precipitated by adding a powdered chemical (I believe is sodium metabisulfite). The "mud" is collected rinsed and dried and melted back to 999.5+ purity. I know of a guy in the USA who uses one to refine the amalgam he gets from stripping the gold plating off circuit boards.

hope this helps.

Regards  
Jeremy

**Jeremy Scott**  
- United Kingdom

---

Nov 29, 2003

TO LETTER # 12200;

YOU NEED A HIGH CURRENT, LOW VOLTAGE UNIT FOR ELECTRODEPOSITION, A SOLUTION OF GOLD CHLORIDE, A FIBREGLAS OR CERAMIC SINK (BLANK ALL METAL), AND TWO WEEKS OF THEORY, SAFETY IN HANDLING, AND PROTECTIVE CLOTHING. I AM SENDING YOU A SCHEMATIC FOR THE UNIT. GOOD LUCK. HAVE FUN !!!

2.5V, 20A. CIRCUIT FOR ELECTROPLATING

[http://www.maxim-ic.com/appnotes.cfm/appnote\\_number/2040/ln/en](http://www.maxim-ic.com/appnotes.cfm/appnote_number/2040/ln/en)

PRODUCTS SOLUTIONS DESIGN APPNOTES SUPPORT BUY COMPANY 50W Current-Mode Forward Converter Design with the MAX8540 This application note details the design of a 50-watt, isolated, forward converter, using the MAX8540 synchronizable, high-frequency, current-mode PWM controller. Design procedures for both the power stage and controller are presented, along with actual performance measurements. The converter delivers 20A of Load current at an output voltage of 2.5V. It employs synchronous rectifiers for secondary rectification. The input voltage range for the converter is 36-75VDC. This design is available as an evaluation board. The evaluation board demonstrates how easy it is to implement the features network and telecom applications require. The design methods can easily be adapted to the design of high performance, full featured off-line power supplies. Key features: 300kHz switching frequency, Programmable input UV/OV Protection Programmable hiccup current limit or latch mode overcurrent protection, Programmable maximum duty cycle clamp with feedforward, Programmable slope compensation with single resistor, Synchronization to external clock, Adjustable current limit threshold, Active low-enable feature for easy turn on/off of converter, Internal leading edge blanking on the current sense pin, Output overvoltage protection Space-saving 16 pin QSOP. Description of Application Circuit Operation Figure 1 shows the circuit diagram of a 2.5V, 20 A isolated forward converter that uses the MAX8540 current mode controller (U1). At startup, the total capacitance at the Vcc pin is charged through MOSFET Q7 and the parallel combination of resistors R30 and R22 from the dc input voltage VIN. When Vcc exceeds the undervoltage lockout threshold of the MAX8540, it goes through the soft-start mode and pulses of gradually increasing duty cycle are applied to the gate drive IC, U8. The MOSFET Q1 therefore starts to switch the input DC voltage across the power transformer T1, used to provide isolation and to step down the input DC voltage to the required level. (Selection of power transformer turns ratio is dealt with in the following section.) Since the energy for driving Q1 comes from the capacitance at Vcc, the Vcc voltage falls. The hysteresis of the MAX8540 undervoltage lockout feature allows this to happen. Pulses on the bias winding of transformer T1 are rectified by D1, regulated, and applied to the Vcc pin. The rectified and regulated bias circuit voltage builds up and prevents the Vcc pin from falling below the undervoltage lockout threshold. The primary side control continues to operate from the bias winding. The MAX8515 (U2) is configured to sense the Vcc pin and turn off Q7 at a voltage slightly higher than the worst-case startup voltage for U1. This avoids unnecessary power dissipation in Q7, R30, and R22. Figure 1. Circuit diagram of 2.5 V, 20 Amp, Isolated Current mode Forward Converter using the MAX8540.

Cheaper to build, and, Oh, might learn something new.

**Paul T. Knisely**  
- Kenmore, Washington, U.S.A.

---

Dec 9, 2003

Scrap recovery using Aqua Regia. I also do scrap recover as a hobby and for learning the silver and gold work fair in this process but we have no luck in the recovery of platinum from catylic convertor honey combs can anyone please comment on this.

**Eddie Kiswani**  
security - Chicago, Illinois, U.S.A

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## Letter #

### Reclaim Gold Finishings [Indiana]

Nov 19, 2003

I am retired and frequent estate sales as a hobby. I find many items with 22k and a6k gold finishes or plated. Is there any practical way to reclaim this gold with out spending thousands on equipment?

**James A. Clore**

hobbyist - Crawfordsville, Indiana, USA

---

Nov 21, 2003

That depends on what you intend to do with it after recovery. Talk to the jewelery teacher. Most colleges have one in the art Dept.

**James Watts**

- FL

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Dec 13, 2003

An aqua-regia solution will take care of your needs. Safety is a concern, but only a minor one if you have experience with acids, that requires rubber gloves, face mask, and a fume hood. Aqua-regia is a mix of nitric and hydrochloric acids. A gallon or two of solution in a five gallon bucket is about ideal for what you want. Immerse the object for a short time {until the gold is dissolved}and then rinse it into a second bucket using a rinse bottle. This has the added advantage that it will reclaim platinum group metals as well. This will work great on ceramic items with the trim, but as a ceramicist I will tell you that the value involved per piece is very small. Any karat gold items could be thrown in, with the added advantage that precious stones are not harmed. Some semiprecious stones like turquoise and opal will be damaged or destroyed. Gold plate or fill can be digested in a muriatic acid{20\* hydrochloric} bath after being cut into small pieces. The leftover sludge and flake taken out by filtering would then be added to the aqua-regia. Economically it would be best to use the solution to depletion before recovering your values. For full details refer to the C.W.Ammen book "[RECOVERY AND REFINING OF PRECIOUS METALS](#)". The chemicals for recovery are available in small amounts from gldman on E-bay. This way you could try a batch to get familiar with the process before you purchase in quantity.

**Marc Bilyeu**

- Bellevue, NE, USA

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Dec 18, 2003

Don't EVER use aqua on gold-plated material. It's very dangerous and totally non-profitable. No man has ever made a profit by dissolving gold-plated objects in aqua regia. No self-respecting gold refiner would ever use aqua regia on gold-plated objects. It's foolishness. It costs

more in chemicals and equipment and waste disposal than the stuff is worth. Even with very heavy plating, it isn't used. About the only thing that aqua regia should be used for is refining solid karat gold items. In that case, you can't do without it.

**Chris Owen**  
Consultant - Houston, TX, USA

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## Letter #

### Response to white gold issue

Sep 11, 2000

I am responding to the white gold letter published in August issue of Metal Finishing [ed. note: the column was largely based on [letter 1237 here](#)]. Customers are sometimes confused about what we do in the finishing industry. The same is true in the jewelry industry.

This explanation may clear up some concerns about white gold jewelry, platinum jewelry and rhodium plated jewelry.

Platinum started a return in popularity about 10 years ago but was also quite popular around 1900 until the 1920's when supply restrictions were imposed because the catalytic properties of platinum made it a strategic metal. Jewelers, because of these restrictions, created a gold alloy containing nickel to meet the demand for a "white" precious metal. Gold is also alloyed to create other colors such as rose, green and various shades of yellow. Platinum is not sold as "white gold" because it is not gold and a 14K white gold ring has the same intrinsic value as a 14K yellow gold ring. It is important to note that jewelry stamped 18K contains 75% pure gold regardless of color and 14K contains 58.5%, etc.

The karat mark is based on 24K equal to pure gold and the Federal Trade Commission has strict perimeters regarding the marking of jewelry. Rhodium is also a precious metal, part of the platinum group and also has catalytic properties. The automobile industry uses rhodium in catalytic converters but rhodium has other desirable properties that make it attractive to jewelers. Most manufacturers of white gold jewelry plate their products with rhodium for the same reason any manufacture plates anything; to enhance the surface. It provides a bright, white, tarnish resistant coating which is very hard and greatly increases the life of the high polish on the gold.

A jeweler might suggest your white gold ring will need maintenance after a few years, just as a car dealer might suggest you new Lexus will need maintenance. He is not saying to throw it away but they both are subject to wear and tear. Ted, just as your mother has had 60 years of trouble-free wear on her platinum rings my own mother has some heirloom quality 14K white gold jewelry which my father gave to her over 60 years ago. It all still looks beautiful and she wears it all the time. Unfortunately there are a few incompetent jewelers out there and like wise there are a few incompetent platers out there and both discredit the industries in which they work.

**Neil Bell**

[Red Sky Plating](#) - Albuquerque, NM, USA

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Sept. 25, 2000

Thanks, Neil.

I had a discussion with [Joseph Mazia](#) about the origins of white gold after publication of the column. Joe, back when he was working for his

father as a precious metal refiner, actually cast some white gold. He concurs with the history and definitions you are using.

So I will refine my question along these lines: What "strict parameters" does the Federal Trade Commission enforce regarding the rhodium plating of jewelry and the marking thereof? If the answer is 'none', then it is obviously long past time. The public expects, and I think they have a right to expect, that an engagement ring or wedding band will be an heirloom that will last a lifetime (or more).

I don't feel your comparison of a ring to a luxury automobile is an especially good one because an automobile inherently requires tens of thousands of moving parts, whereas a ring is one piece that just has to 'sit there'. But if we do accept your example, then just as is the case with a luxury automobile, all required 'maintenance' should be prepaid and the repairs should be 'portable', i.e., wherever the owner lives, s/he should be able to take the ring to a local facility for replating when necessary, with all repair charges charged back to the jeweler who sold it.

It is nothing short of outrageous that a complex machine like an automobile can be warrantied for years, and the finish on a doorknob or bathroom fixture can be warrantied for life, but an heirloom as precious as an engagement ring or wedding band can come with plating that need not meet any specifications at all and may wear off in a few months or even a few weeks and the jeweler can get away with it.



**Ted Mooney, P.E.** - finishing.com Inc. - Brick, NJ

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Nov 29, 2000

I have a white gold engagement ring that was purchased in August of 2000, and it started out quite yellow.

At first in the store I thought it was yellow gold, but it is whiter than their yellow gold. It is 14 kt. We bought the ring anyway because the diamond was so good for the price.

After shopping around for wedding bands, I felt a little bad about my ring being so yellowish, so i thought I would get it Rhodium plated (I had been told by another jeweller about the plating). When I talked to the jeweller who we got the ring from they said they do not plate their white gold rings, which would explain why they are yellower than other stores, so we went to another jeweller and they said they could do it for \$40 and it would take 7 days.

Then today at another store, same chain as the one who said they would do it for \$40, the women told me that real white gold is really really white, and that the white gold at her store is just rhodium plated yellow gold...then she said where my ring was from must do a bad job, and said it was plated, but badly, and wore off already, even though I told her it hadn't changed colour at all since I got it. I told her it was always yellowish, but I wanted it plated so it would match other stores wedding bands, and she said that even if it was plated it would always be yellower and wear off faster than my wedding band if I purchased it else where. I think she was just talking bad about my ring because it was a competitor's, and she seemed to have no idea about what she was talking about, and contradicted herself.

Gold is gold right, and if I get mine plated, why would it wear off any sooner than another ring I wear? And with all of these horror stories about bad plating jobs, how do i know where to go to get it done? And Also the thing about jewellers taking the good diamonds out of rings and replacing them with fakes, is there a way to guard against this. I would be worried if I took it in to get it plated this could happen, so how do i find a reputable jeweller to do this, is is best to go through a big national chain store. I am very apriciative of any help you can give me. After talking to the sales women today, I felt vary sad and confused. I LOVE my ring, it is so special to me, and she made me feel like there could be something wrong, and not fixable, so i am very happy to have found this site, and learned more about white gold, perhaps I will have to teach her now! Thank You

**Marcie Patton**  
- Calgary, Alberta, Canada

---

Nov 29, 2000

Yes, Marcie, pure gold is an immutable element. And it is yellow; there are no white gold isotopes.

As Mr. Bell explains, all 14 kt gold rings are composed of 58.5 percent gold. The remaining 41.5 percent is other metals. And, depending on what those other metals are, the ring will be yellow or whitish (or pinkish, greenish, etc., etc.)

But "white gold" is not 'really really white'; white gold is the color of ... your ring, of course.

If you want your ring to be 'really really white' you need to have it rhodium plated because rhodium is really really white. Sorry, I have no knowledge of whether some jewelers would swap stones and how you could best avoid that except by dealing with trusted people.

And I am still searching, myself, for any thickness/wear standards that jewelers apply to their rhodium plating. Rhodium is so expensive (much more expensive than gold) that I'm sure there is great pressure to apply no more rhodium plating than is necessary to fool the customer long enough for the warranty to expire.

**Ted Mooney, P.E. - finishing.com Inc. - Brick, NJ**

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Jun 30, 2001

Hello,

Apart from nickel and platinum could you please tell me what other metals can be alloyed with 22k to make white gold ?

Many thanks,

**Kojo Bonsu**  
Ideas Jewelry - Accra, Ghana

---

Aug 23, 2002

Thanks so much for making this information available on line - it's nice to know I'm not alone.

I've had the most awful experience with my ring. Now that I read these articles I remember why my white gold band was yellow-spotted after I had it sized. It took me 45 minutes with the jeweler (mall chain that I had THOUGHT was reputable...) to get them to see the yellow spots. I brought it in to have it re-buffed and to have a prong fixed and it came back the same way - and the diamond was chipped. My diamond was laser engraved, so after I learned how to use a loop I knew they didn't switch it. 3 months later, after lots of tears and lots of trips to see poor quality replacements, I finally got a ring that was comparable to the value of my initial ring. When I had the new ring sized it again came back spotted. I was frustrated and did not mention it right away. It started to turn yellow within the week, and now - one month later - it is completely yellow. I've been back and they told me "that's just the way white gold is."

I went to a different chain (who happened to own the other chain I had been to), and they told me about the rodium plating. I was shocked - like the other writers - that they can market something that is not what it seems. After all, my grandmother's and mother's settings stayed steel-colored, certainly not yellow!

The jeweler has agreed to have my ring re-plated a week before my wedding. They said it would normally cost \$800 to have this done. Would you please verify if this is indeed a true cost? If it is, I would suggest getting a platinum band to anyone thinking about white gold. It may be a little darker, but the maintenance on re-plating my white-gold ban is going to be much more expensive in the long run.

**Jennifer Anderson**  
- Duluth, MN, USA

Aug 28, 2002

\$800 sounds outrageous to me! It is impossible to fully understand what is going on because there are so many jewelers, so many plating shops, several varieties of white gold, some yellow gold that apparently is rhodium plated and then sold as white gold, etc. etc.

But my wife's white gold engagement ring is 33 years old and still looks fine. It is not brilliantly shiny like rhodium, but it's not yellow. My suspicion is that some "white gold" rings, perhaps including yours, are yellow gold with a thin rhodium plating that wears off.

If the ring were truly a white gold, the discoloration as the plating wears should not be obvious; and if the plating were heavy enough, it would be many years before the problem surfaced. From this distance it sounds like your ring is actually yellow gold and the plating was thin.



**Ted Mooney, P.E.**  
finishing.com Inc. - Brick, NJ

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Oct 11, 2002

Thank you so much for addressing this issue. My daughter, married this year, has returned her wedding ring set 4 times !!! for replating. I am very upset that this could happen with something as precious as wedding rings. I have a BS in Chemistry and own an electroplating company. I am VERY interested in helping to resolve this most disappointing problem, where might I begin?

**Sam Swain**  
- Provo, Utah, USA

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Jan 7, 2003

I am also having problems with my white gold ring. Surprise, surprise! I was very happy with the colour when I purchased the ring. A month later I took it back to be sized. When I got the ring back it looked great. Less than two weeks later it was turning yellow. They assured us that it was NOT a yellow gold ring that had been plated before we purchased the ring. I returned it yesterday and asked that they send it to the manufacturer to be replated as I did not trust the quality of the place they normally use.

Regarding the question of how to make sure that they don't replace your diamond: Most jewelers have a diamond tester that sends a laser light thru the diamond and it beeps if they are real. Have them test it before they take it from you and after you get it back.

**Krissy Walsh**  
- Waterloo, ON Canada

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Mar 30, 2003

Hallo everybody,

I would like to know that why other goldsmith's are not plating platinum on yellow gold and white gold items instead of rhodium?

Is rhodium plating is lasting then platinum plating?

In ready made rhodium solution there is 2 grams of rhodium in 1liter and it'll plate 60 to 100 seconds only that means it is flash plating.

Advise how to plate more thicker of rhodium and platinum plating.

Thanks,





**Dipen C. Pattni**

R & D Jewellers Ltd. - Dar-Es-salaam, TANZANIA

Dec 24, 2003

\$800 for Rhodium plating is a rip off. Yes some rings are made from yellow gold and has been rhodium plated. White gold rings are a mixture of metals. Some with nickel and some with palladium. Even if a right white gold product is made with rhodium plated, it will not turn yellow, because the white alloys in that metal bleaches out the yellow colour of gold. And if any jewellers says that its normal for a white gold ring to turn yellow, dont ever go there again. And \$800 for plating ?? that guy is worst than a robber.

**Kenneth Tran**

- Australia

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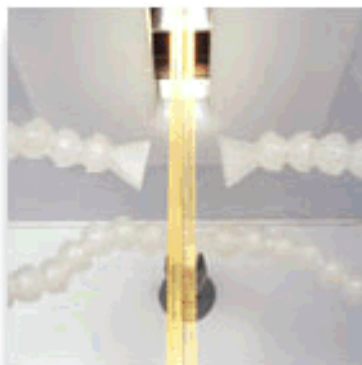
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## Letter #

### 4 categorizations of ring alloy types [California]

Mar 5, 2003

Hi all,

Continuing the idea from the previous posting (the central problem being plating quality)...

From my knowledge of castings and coatings, I would believe there exist four categories separate categories of rings based on their constituent alloys and coatings:

- 1) Cast, malleable precious alloys- Gold alloy (e.g. Gold-Copper-Silver-Zinc based); Platinum alloys (e.g. Platinum-Silver based). No platings are needed when the metals in platinum family or right level and when percent of gold/copper/silver mix.
- 2) Cast, malleable, plated precious alloys. Expensive White Gold (Gold alloy with Palladium, not Nickel). Additional plating desired to improve finish and durability but not to protect color or prevent reactions.
- 3) Cast, nonmalleable, non-plated precious alloys- (e.g. Gold with Nickel not Palladium). Sufficiently thick Rhodium platings improve color (no transparency) and resistance to Nickel reaction. And very thick, high quality platings endure.
- 4) Cast, nonmalleable, plated non precious alloys (e.g. Nickel-Copper-Zinc or similar) with very thick, quality platings to prevent skin reactions. Balfour/Josten's employ proprietary quality assurance designs and processes to achieve high effectiveness and high reliability, thereby making non-precious rings wearer safe and long-lasting.

Apparently, the categories involving, especially Rhodium plating on Nickel-based substrate (2), represent majority of reporting issues concerning see-through and wear-through. Further, these are problems of plating rather than casting or melding.

I recommend that alternatives for finishing such categories of rings be developed. The highest quality metals are not finished by plating. Taking the examples of metal parts for mass manufactured consumer apparel, such as gold watches and eye-glass frames, these are plasma coated and/or sputtered instead of plated for more uniform coatings.

Since White Gold is less malleable anyway, I conclude the problem is transiting the finishing step from goldsmiths to technical labs specifically designed for plasma and/or sputtering techniques. I recognize that moving such a centralized process would increase the quality and, hopefully duration of finishes. In addition, central sputtering would save tremendous cost due to the relative efficiency and cleanliness of plasma) and recycling of materials in near vacuum. Alternatively, centralized plating would benefit from many efficiencies as well. However, the separation of goldsmithing from coatings has the drawbacks of additional time and expense that may dissuade general adoption or hinder public acceptance. Category 2 rings should be phased out because the Nickel reduces value of precious metals. Category 4 rings are mass production item and accepted as such. For everyone not willing to incur additional cost and effort for plating (or coating) requirements of category 3 rings, I recommend staying with category 1 rings and purchasing the kind of precious metal within available budget- either gold, platinum, (or even palladium if that's feasible). If anyone has questions regarding these issues, please contact me. Otherwise, post for others to read.

**Robert Potter**  
- San Francisco, CA

Mar 10, 2003

Ya know, this is funny. I've written repeated editorials going back as far as 1997 on the subject of the plating industry's singular focus on environmental resistance, and its failure to take public pro-active positions on important consumer issues like nickel in jewelry, and gold plating and rhodium plating standards for jewelry.

And now here we go with Mr. Potter's otherwise extremely knowledgeable presentation, which contains the fundamental but understandable error of asserting that plating is a low quality technology such that these consumer problems would be resolved by switching to sputtering or plasma.

In a sense, though, he is correct. Plating of these rings and heirlooms has delivered nothing but heartache to millions of disgusted consumers. Can we realistically demand their sympathy and understanding that "plating is better than that" when we in the industry have done nothing and are doing nothing to help protect them from plating practices that we know continue to disillusion and victimize consumers tens of thousands of times every day?



**Ted Mooney, P.E.**  
finishing.com Inc. - Brick, NJ

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Solution to corrosion

[Titanium Tantalum Products Ltd.](#)

86/1, Vengaivasal Main Road  
Gowrivakkam  
Chennai, Tamilnadu 601302  
India

Contact: Mr. Karthik  
Phone: +91-44-22781210 or +91-44-22780211  
Fax: +91-44-22780209

**Products:** Manufacturers and suppliers of all types of Ti/Nb anodes for plating industries such as gold, high speed, hard chrome, rhodium, platinum, copper, nicosulphate and precious metal recovery plants and others.

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## Letter #

### Post drag out recovery of gold via IX, What resin is best?

Jan 8, 2000

The company I work for has recently set up its first gold plating line for wire. I am currently using strong base anion resin to reclaim any gold from my rinse water after my drag out rinse station. I use this successfully on my cyanide silver line. I have been told that this resin probably would not work for gold reclamation due to the chelators present in commercial gold baths. Is this true? Do I need to investigate some of the chelating resins? SBA resin is so cheap compared to the chelating resin, I would like to continue to use it, but if I'm losing gold it is obviously worth while spending the money for resin that works. I use electrolytic recovery in my drag out. The flow rate of the rinse water through the 8" x 48" cylinders does not exceed 2 GPM. Thanks in advance for any assistance.

**Gerald D. Smith (Jerry)**

- Bloomingdale NJ USA

---

*First of four simultaneous responses--*

Jan 8, 2000

I would have it run into a large treatment tank and put a "Gold Bug" in that tank. This will electrolytically recover most of the gold and cost a lot less per troy oz recovered than the resins. I would follow up after the gold bug with the resin to remove the last traces of gold.

The company that supplies your gold should be able to tell you if the chelators will cause a problem. Major resin companies like Rohm & Hass should be able to answer that question after they know the concentrations of all of the stuff in the rinse.

**James Watts**

- FL

---

*Second of four simultaneous responses--*

Jan 9, 2000

I don't think you need worry about this, if it's a cyanide gold. In that case all the Au is present as anionic complexes and hence isn't available to be chelated. I believe the chelators are added to keep the nickel, cobalt, or whatever(added to "hard golds" for hardness) in solution.

**Dave Wichern**

Bryant Laboratory - Berkeley, CA

---

*Third of four simultaneous responses--*

Jan 9, 2000

Hi Gerald ,

Why bother with the complexities of Ion exchange for recovery of precious metals , there are many fine "Plug-in" units available for electrolytic recovery from Drag-outs & even running rinses .

I would start by calling Jaynor Inc who are located in Cary Illinois (847) area code .

If you want to persist with the ion exchange then call Resin Tech of Cherry Hill New Jersey , they are masters in using the right resins .

regards



**John . C . Tenison - Woods**  
Peninsula Metal Finishing Consultants P/L - Victoria . Australia

---

*Fourth of four simultaneous responses--*

Jan 9, 2000

Jerry,

You should have no problem recovering gold using strong base anion resin. The only strong "chelator" in most gold baths is cyanide, unless you are using a sulfite system, or you have a acid gold chloride strike. The gold is in the form of a gold cyanide complex which exchanges quite nicely. And free cyanide comes out on the SBA resin as well.

The problem you will have is that the gold cyanide won't be fully removed if you try to regenerate the resin. You are better off just sending it to a refiner to have it ashed for metal recovery when the resin is loaded.



**Bill Vins**  
[Chemical Solutions](#) - Mesa, Arizona

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Jan 10, 2000

Thank You all for your responses. The bath is a neutral cyanide bath. I am extremely limited for space so a large holding tank is out of the question. This a wire plating line which has DI water dripping on the contacts on either side of each plating cell to prevent salt buildup, which insulates the wire from the contact. There are ten contact stations for the gold alone. The gold in this water is what I am trying to remove with the SBA resin. This rinse water does not pass through my drag out rinse station, it gets pumped through the resin, and then to cyanide destruct.

The drag out station pumps from a heated reservoir on the floor to the rinse cell and then drains back to the reservoir. I do have a Gold Bug

operating successfully in the reservoir of the drag out station. The drag out is the first real rinse the wire sees after plating. I periodically bail out the reservoir, pass the water through the SBA resin, and send it to cyanide destruct, and refill the drag out with rinse water. After drag out there are two more rinses, the last being new DI water.

As there is a potential for significant gold in the water which bypasses the gold bug I will contact my gold bath vendor about the potential interference with IX. The Resin Tech lead is appreciated. I do not regenerate, the resin goes to refining after break through.

By the way, the first time I tried using a Gold Bug was on my silver cyanide line where I do not yet have a drag out, (no room). I was attempting to use it in a flow through tank with very low concentrations of silver, and no significant dwell time. It did not work. That is where I first started using IX to reclaim my silver.

**Jerry Smith**  
- Bloomingdale NJ USA

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Mar 20, 2001

We have a dry lake bed with large amount of water that holds precious metals in solution and wish the best way to recover same resin works good but expensive. Other suggestions are welcome. The lake is over 24 miles long and 500 feet deep with water us to three feet from surface. Interested in operators to process the water.

**Marks Morrison**  
Industrial Minerals - Windsor, CO

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## Letter #

### Want personally designed platinum rings [Oregon]

Jun 16, 2003

I am very interested in finding the perfect ring for my soon to be husband and platinum seems to be the metal I am most impressed with. I was wondering if you could tell me where I could find a good place to design platinum rings of our own at a reasonable price?

**Sondi Stewart**

- Albany, Oregon, United States

---

Jun 17, 2003

Platinum is expensive compared to gold, so reasonable is a very relative term. The only answer is to shop long and hard, then hope.

**James Watts**

- FL

---

Jun 18, 2003

Sondi,

Albany OR is the US center for expertise in refractory metals like niobium- which may change your mind about platinum. Niobium would be far stronger than platinum, and can be colored by anodizing. It also has a "unique" status, in that it is uncommon for wedding rings, since few people can fabricate it well. Metal Technology (formerly B-J Enterprises) is one of the firms that would be worth a local phone call.



**Lee Gearhart**

- East Aurora, NY

---

Jul 20, 2003

You might want to look into PMC (Precious Metal Clay). I know that you can buy platinum PMC.

PMC is a soft clay that contains zillions of little pieces of precious metal held together by an organic binder (sorry for so much technical

jargon). After it is shaped like you want it, it is fired in a kiln to burn off the clay and melt the metal, and the result is (hopefully) a silver/gold/platinum piece that looks like your sculpted clay. Only smaller; the whole thing shrinks about 30%, I think, during the firing.

There's also liquid PMC that can (for example) be poured onto a leaf or pine cone or something and fired, burning off the organic material and leaving the metal.

I've seen people offering classes on how to make rings using PMC, so I'm pretty sure that it's possible. And the medium allows you to make extremely detailed designs.

Happy marriage to you! I hope that you find exactly what you want...in the ring and in your mate.

**Greg McAlpin**  
- Fort Collins, CO, USA

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