

Precious White Cinderella

By Wolfgang Wrzesniok-Rossbach, Head of Sales & Marketing, Heraeus Metallhandelgesellschaft m.b.H.

As ruthenium rises from two- to almost four-digit prices in less than a year, many are left wondering why. And many more may wonder what it is.

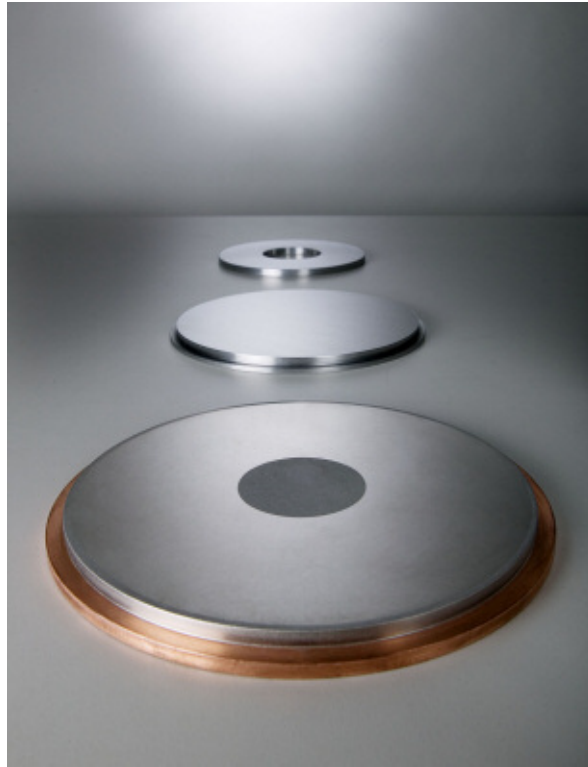
Imagine that, in a year's time, gold is trading at \$7,000 an ounce or oil at \$600 a barrel – both around ten times above their current, already high prices. Impossible? Well, in the last twelve months one of the platinum group metals has experienced exactly such a performance: ruthenium.

This extraordinary price move has attracted great attention in the precious metals community, and that has led to a kind of “second discovery” of ruthenium, nearly 165 years after it was first isolated as an element by Karl Klaus. Klaus, born in Estonia and of German descent, was a professor at the University of Kasan. He named the metal after Ruthenia, the Latinized form of the word for his Russian homeland. Today, this platinum group metal is used in the chemical and electronics industries.

Now, more than a century and a half later, equity analysts, who had barely heard of the white metal until six months ago, suddenly have started to discuss its technical uses, its chemical characteristics and, above all, its potential to boost the earnings of the platinum mining community, especially in South Africa. And even the ruthenium that is far from being a primary product has begun to inspire the precious metals community. One of the junior miners in South Africa, expecting to commence production in the second half of 2008, announced in March that it expects its future revenues to rise by \$10 million a year compared to their original feasibility study – simply because of the rise of the ruthenium price.

From Footnote to Fast Track

A metal that has in the past been at best a footnote in annual reports has grown up, featuring in articles on Reuters, Bloomberg, Platts and, now, in the *Alchemist*. Suddenly all the leading mining houses provide detailed production information about what has become the third-most-expensive platinum group metal. Anglo Platinum Ltd. announced



Left – Sputtering targets for magnetic data storage devices.

Below – Heraeus: production of sputtering targets for the electronics industry in Chandler/Arizona.

All photos courtesy Heraeus



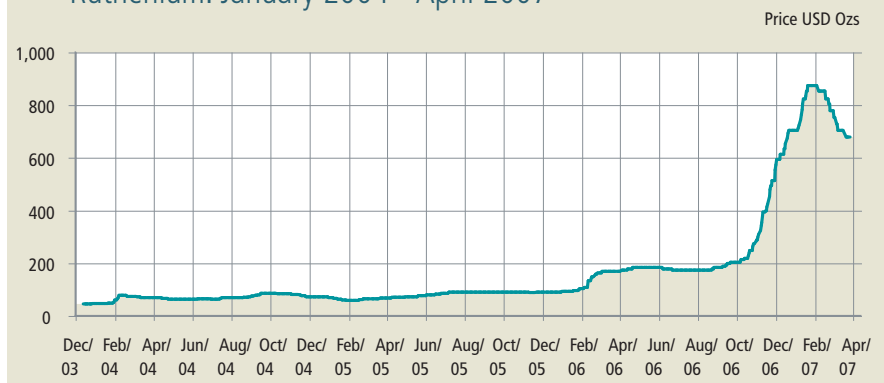
in February that its annual output of ruthenium is around 500,000 ounces. In the same week Impala Platinum said that it plans to dig out about 250,000 ounces in 2007, and Lonmin Plc's production will stand somewhere between 150,000 and 200,000 ounces at the end of this year, according to figures published for the first quarter.

All in all, little more than a million ounces will reach the market during the current year, with the entire quantity more or less consumed by the various industries using it.

For 2006, Johnson Matthey reported annual industrial consumption of nearly 940,000 ounces (versus 834,000 ounces for 2005), and the number for 2007 is expected to exceed last year's figure.

With physical consumption rising, it does not seem likely that the future increase in production – a result of the expansion of the South African mining industry into the eastern parts of the Bushveld complex containing ore with higher ruthenium portions – is weighing too heavily on the metal's supply and demand

Ruthenium: January 2004 - April 2007





Targets are produced for the electronics industry.

balance. But if production and consumption are not too far apart, what in the end was responsible for the tenfold increase in the value of ruthenium over the last 12 months?

Unlike the cases of other precious (and probably base) metals, the investment community did not cause the price rise – neither the more short-term-oriented speculators nor the more long-term investors. There were some limited investments in ruthenium when the price first started to fly, but compared to the overall market size, they appear to have been relatively small, with most investors apparently opting to refrain from any activity in this market. Given its extremely illiquid nature, this is an understandable reaction. There were a number of occasions in recent months when it was almost impossible to buy or sell any quantity of the metal at all.

In addition to the small stocks in the hands of investors, there certainly was also a reserve of refined, but unsold (i.e., unneeded in the past) metal in the vaults of the mining corporations. However, when prices started to rise, neither of these additional supply sources lasted very long. Instead they were emptied due to profit taking and liquidation, in the region of \$300 to \$450 an ounce.

Therefore the cause for the dizzying price rise was not a production shortage. Nor was it a result of massive investment money flowing into this small market, which in early 2006 had a total value of less than \$100 million. It has grown in the past twelve months to a size of around \$600 million – still about one



Hard disk drives are coated with a total of up to 16 different layers, four of them containing ruthenium.

quarter of the size of the much more renowned palladium market.

Of Flat Screens and Thin Films

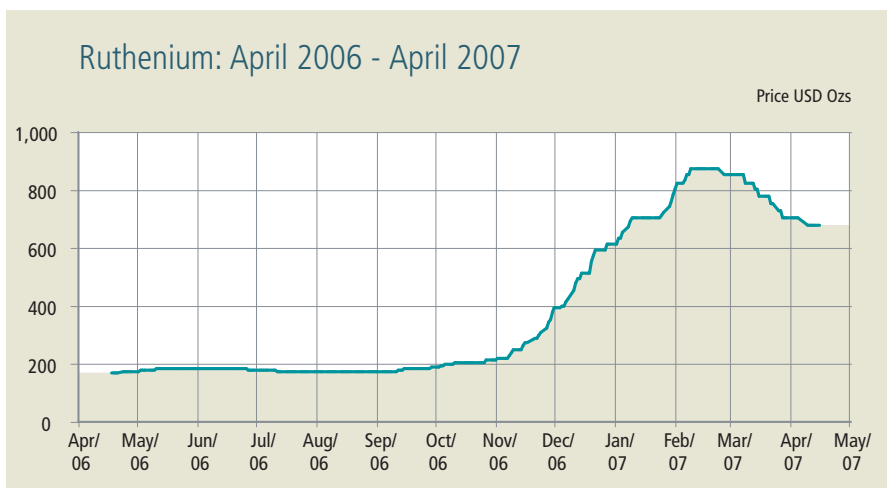
In our view there were two reasons that explain the price increase. First was that global refining capacity wasn't able to cope with the sudden rise of the market size on both sides of the supply/demand equation, thus creating a backlog. Secondly industrial demand did not grow smoothly; rather it was jumpy and concentrated in the second half of 2006. This was certainly in part a result of the healthy state of the global economy, with its general hunger for raw materials, but it was even more a consequence of capacity increases and of technological changes in the most important industries for ruthenium, the

chemical sector and the electronics industry.

Chemical companies use the white metal as process catalysts, for example in ammonia synthesis and for homogeneous catalysis. Ruthenium is also used in the electrochemical sector, as a coating for titanium electrodes in chlorine manufacturing. In the past, both sectors have accounted for about 30 percent of annual consumption.

That significant share of the chemical industry is shrinking currently as new applications in the already biggest sector, the electronics industry, are becoming more and more important. A few years back, ruthenium was used in electronics mainly for the manufacturing of printed electronic resistors. Now two new uses have led to a sharp rise in consumption in recent months and years. First is the use of the metal in large flat-screen plasma television sets, where ruthenium is used to improve the quality of the images.

However, by far the more significant increase came from the introduction of new technologies in data storage on hard disc drives. Here the technology shifted recently from longitudinal (horizontal) to perpendicular (vertical) data storage. The increase in storage capacity of ruthenium use is now four (of 16) layers of a hard disc drive, which grew 35 times. While the consumption of ruthenium would increase for that reason alone, forecasts predict that the production of hard disc drives will rise from the 261 million produced in 2003 to 750 million in 2010. In the next five years the industry expects to



produce as many hard disc drives as it had in the last 50 years.

At least in the beginning of that expansion phase, the consumption of ruthenium in the sector will grow even faster than the actual sales numbers of drives would indicate. The reason is that the sputtering targets (metal plates containing pure metal or alloys of varying sizes) used for the coating of a substrate are not completely used up in the production process for disc drives: only around one third of the metal (be it ruthenium, platinum or others) actually ends up on the substrate. The remainder has to be recycled into fresh targets. This technique obviously requires a huge stock of material that is bound in the various stages of the sputtering process. Therefore, as long as the production capacity for various uses grows, the metal amounts bound in the process rise disproportionately.

Volatility, noun; see: Ruthenium

The Thin Film Materials Division of Heraeus is one of the world's largest manufacturers and suppliers of targets for hard disc production. Our magnetic data storage materials coat more than one-third of all the hard discs produced globally. In close cooperation with the end-users of the targets, every possible attempt is currently undertaken to not only reduce the need for excess metal, but also to speed up the process of refining 'used' targets.

It seems that only by doing so can the ruthenium market be kept somewhat in balance, thus avoiding further price explosions like the one seen in the last 15 months. Starting from less than \$100 per ounce, the ruthenium price increased within 12 months by more than eight times, and peaked in February at \$875 an ounce. Just before the end of the fiscal year in Japan, demand dried up and traders trying to take profits on their long positions later drove the market back below \$650. The price is now around 25 percent off the highs seen in early February and, surprisingly, industrial demand is still absent. The big question is whether the market will come off further or resume the up-trend that it experienced for most of 2006.

While the ongoing expansion of production facilities in the electronics industry makes the second scenario more likely, the first one cannot be discounted totally. There are already industries scaling back their ruthenium use, notably the chemical industry, but also the aircraft engine industry, where ruthenium otherwise might have been increasingly used in high-temperature single-crystal super alloys.

So can the price still go to \$1,000 an ounce? It's a tough call, but given the developments in recent weeks this seems less likely. On the other hand, could it fall back to \$100? That is even more unlikely. There are too many possible applications, and too many

potential users are waiting for a massive price setback in order to set foot into this small, \$600-million-sized – but nevertheless extremely exciting – sector of the precious metals market. ■



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He was previously a Director for Dresdner Bank AG and its investment banking arm, Dresdner Kleinwort Wasserstein. He spent 21 years with Dresdner in Frankfurt and Singapore as precious metals and derivatives trader and, later, as head of the precious metals and commodities desk in Frankfurt.