

## WEBINAR

Reducing rhodium content in platinum equipment for glass making industry - impact on material performance and capital invest

## AGENDA

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**Welcome**

- Introduction of Sophie Franchitto
- Introduction of Dr. Matthias Wegner

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**From a glassmaker's point of view**

- The right choice of material
- Platinum – key player in glassmaking

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**Increasing Rh price and the need for product alternatives**

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**ODS materials**

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**DPH**

- What is DPH?
- Properties of DPH alloys

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**PtRh5 DPH**

- Solution with less Rhodium content
- Properties (rupture and creep strength)
- Sample calculation

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**Summary & Outlook**

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**Heraeus Material Database**

## HERAEUS EXPERTS



### **Dr. Matthias Wegner**

Head of Innovation, Business Line Functional Materials

+49 (0) 6181 35-4540

matthias.wegner@heraeus.com

Heraeusstrasse 12-14

63450 Hanau, GERMANY

[www.heraeus-precious-metals.com](http://www.heraeus-precious-metals.com)



<https://www.linkedin.com/in/matthias-wegner-87618112a/>

## HERAEUS EXPERTS



### **Sophie Franchitto**

Technical Sales Manager, Business Line Functional Materials

+33 6 88 20 00 16

sophie.franchitto@heraeus.com

12 avenue du Quebec

BP 630 Villebon-sur-Yvette

91945 Courtaboeuf Cédex, FRANCE

[www.heraeus-precious-metals.com](http://www.heraeus-precious-metals.com)



<https://www.linkedin.com/in/sophie-franchitto-91a60286/>

## FROM A GLASSMAKER'S POINT OF VIEW: THE RIGHT CHOICE OF MATERIAL

Which material is best suited for my equipment?



My expectations in terms of ...

Glass Quality



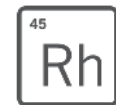
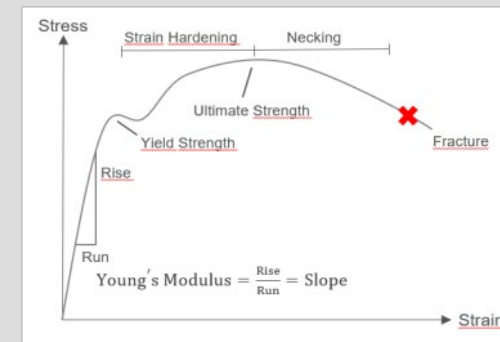
Mechanical Resistance



Life Time



Price



# PLATINUM – KEY PLAYER IN GLASSMAKING

**Pt**

Platinum

- Soft, dense, malleable, stainless, wetted by glass
- Not very resistant to hot mechanical stresses

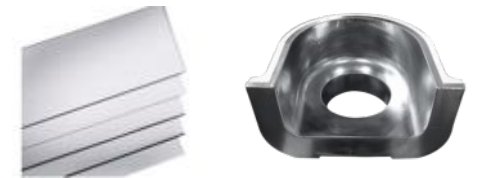
## Actions of Rhodium when alloyed with Platinum

Characteristics	Rh
melting temperature	↗
density	↘
hardness	↗
ductility	↘
creep resistance	↗
electrical resistivity	↗
glass wetting	↘
corrosion resistance	↗
content range %	5 / 30
standard alloys	<b>PtRh10</b> <b>PtRh20</b>

Pipes / Refiner ●



● Cladded Parts



● Feeder Cell



Stirrer / Plunger ●



# DYNAMICALLY DEVELOPING RHODIUM PRICE REQUIRES ALTERNATIVE PRODUCT SOLUTIONS



- **Rh**
  - 2016: 20 EUR/g
  - 2021: 515 EUR/g
- **Pt**
  - 2016 & 2021: ca. 30 EUR/g

## High and volatile Rhodium price leads to ...

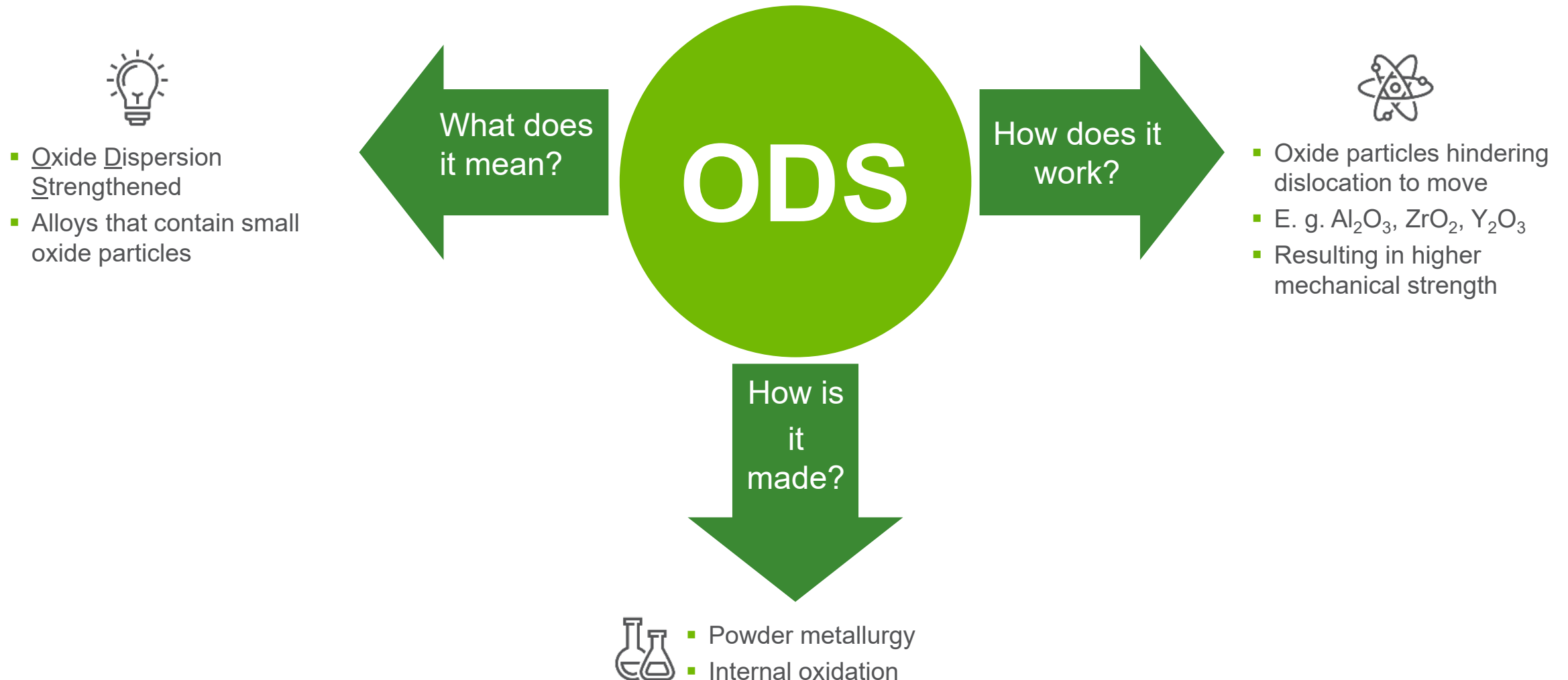
- challenge for glassmakers implementing PtRh alloys in their production to balance manufacturing costs against revenue
- increasing financing costs, higher capital commitment
- impact on profitability

## Heraeus can counter this with a new material

**DPH**

Source: Heraeus Price Chart Tool | [herae.us/charttool](https://herae.us/charttool)

# WHAT ARE ODS MATERIALS?





## WHAT IS DPH?

**Dispersion Hardened**

Excellent corrosion resistance



Excellent thermal stability



Superior creep strength

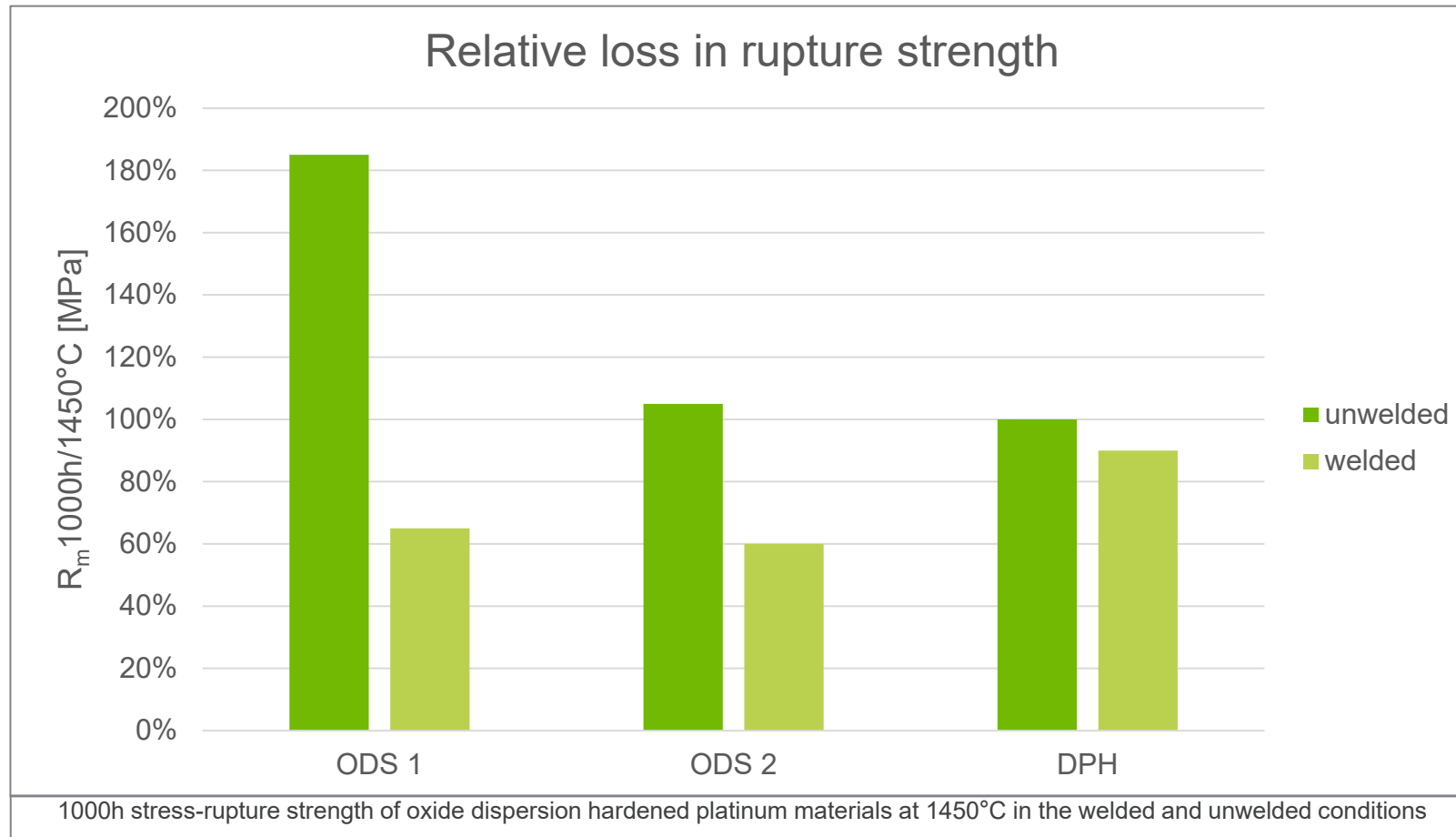


Only PGM ODS material available produced via bulk internal oxidation



Excellent weldability (direct consequence of bulk internal oxidation process)

## PROPERTIES OF DPH ALLOYS



Source: Fischer et al., 25th IPMC, June 2001

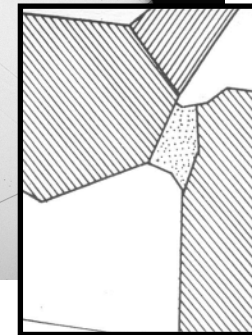
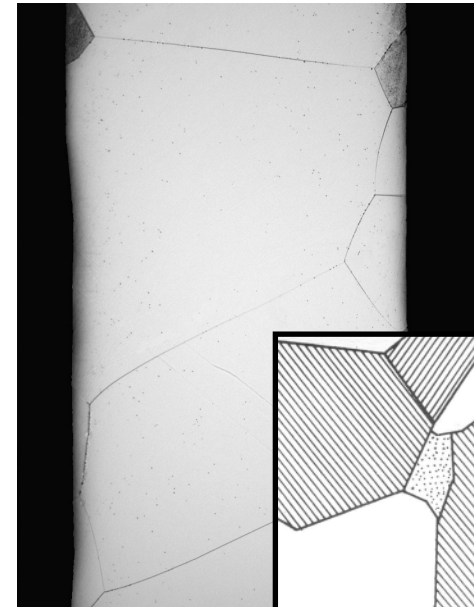
## PROPERTIES OF PTRH5 DPH

### SOLUTION WITH LESS RH CONTENT

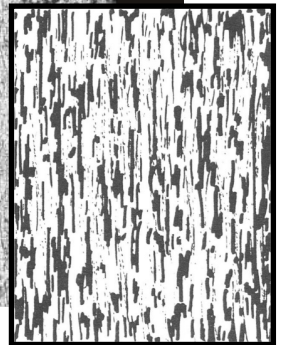
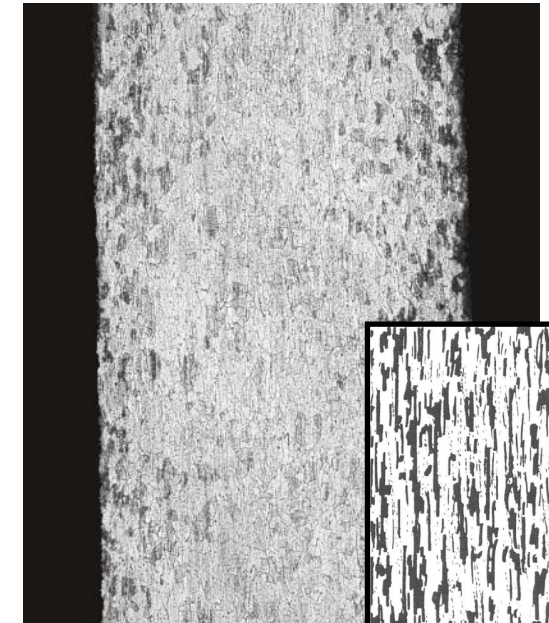
- PtRh5 DPH commercially available
- full-value substitute for standard Rh10, Rh10 DPH and Rh20 alloys

### FEATURING ALL WELL-KNOWN DPH-PROPERTIES

- typical corrosion resistance of DPH materials
- Featuring high coarse grain resistance
- High ductility – well-suited for temperature fluctuation heat up and cool down phases
- Largely maintaining its properties after welding



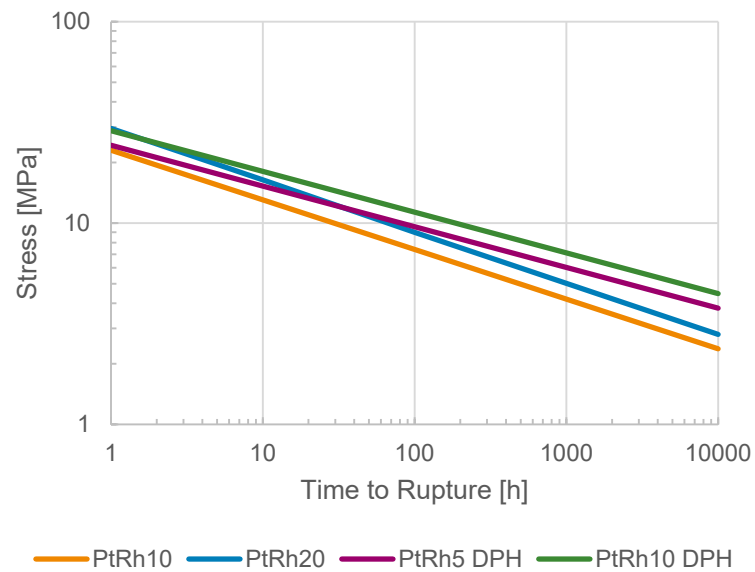
PtRh5



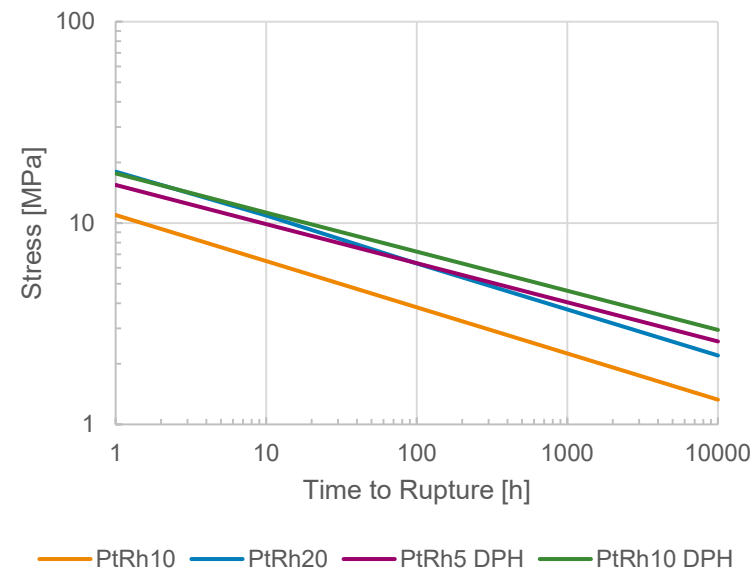
PtRh5 DPH

## DPH PROPERTIES: RUPTURE STRENGTH

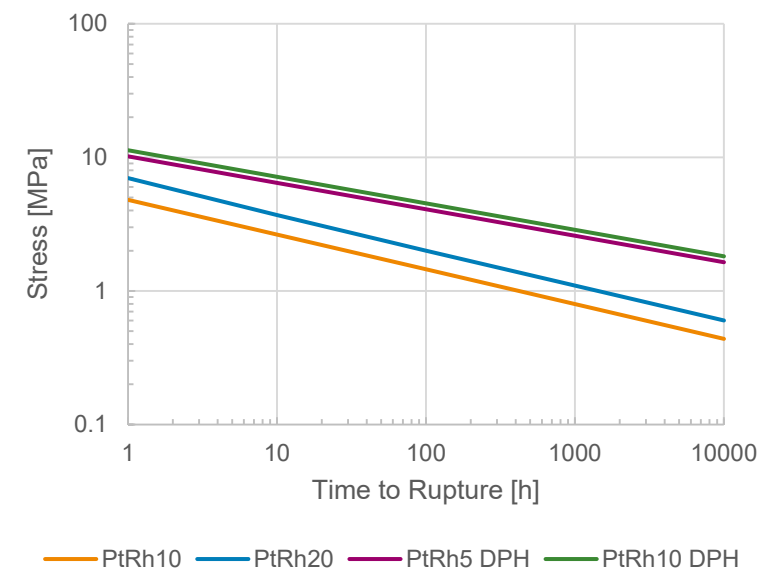
Rupture 1200°C



Rupture 1400°C

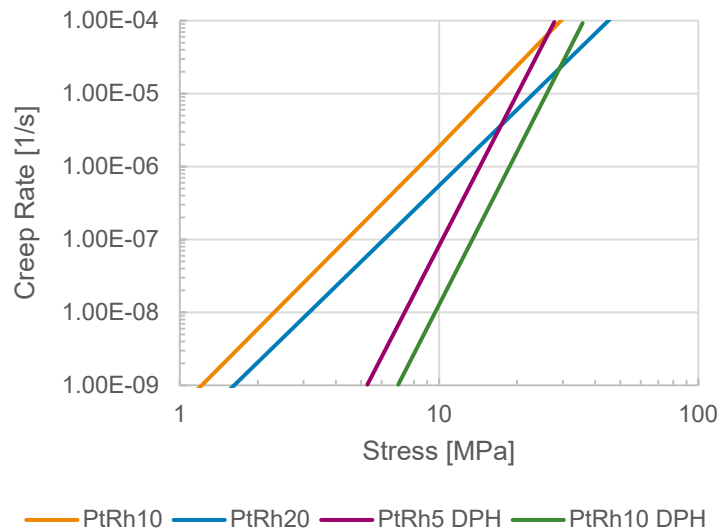


Rupture 1600°C

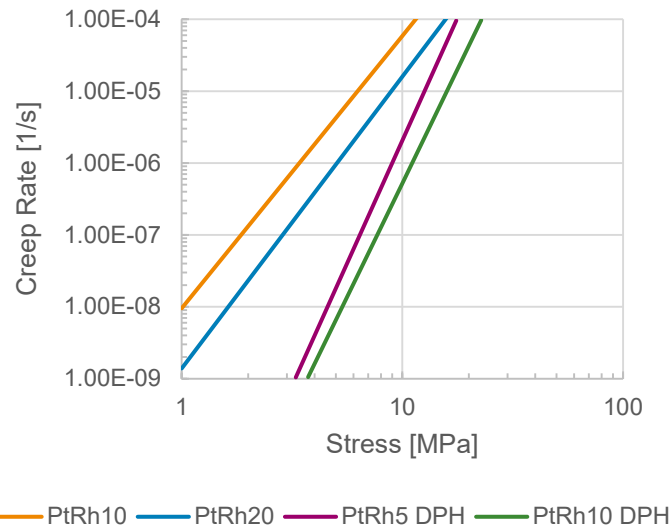


## DPH PROPERTIES: CREEP STRENGTH

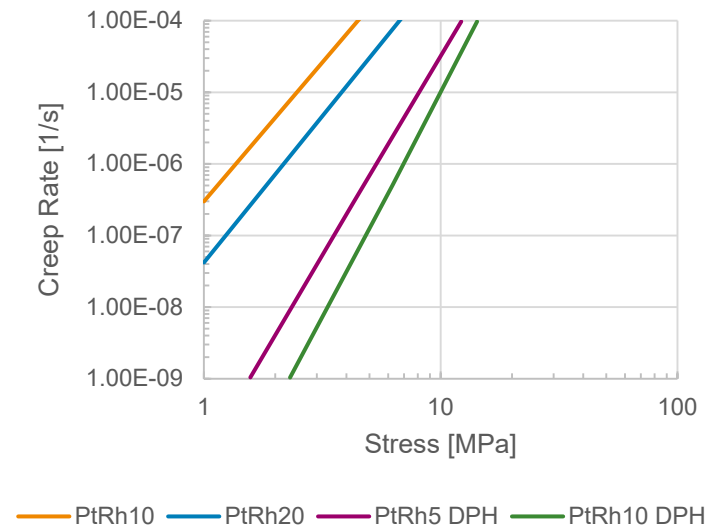
Norton 1200°C



Norton 1400°C



Norton 1600°C



# SAMPLE CALCULATION FOR THE BUILDING OR REBUILDING OF A FURNACE

	Total PM weight [kg]	Pt weight [kg]	Rh weight [kg]	Pt amount [€] 09/09/2021	Rh amount [€] 09/09/2021
Furnace A in PtRh 10%	100,00	90,00	10,00	2.699.100	5.174.700
Furnace A in PtRh 5% DPH	104,00	98,80	5,20	2.963.012	2.690.844

**savings**



**2.219.944 €**

	Total PM weight [kg]	Pt weight [kg]	Rh weight [kg]	Pt amount [€] 09/09/2021	Rh amount [€] 09/09/2021
Furnace B in PtRh 20%	100,00	80,00	20,00	2.399.200	10.349.400
Furnace B in PtRh 5% DPH	110,50	104,98	5,53	3.148.200	2.859.022

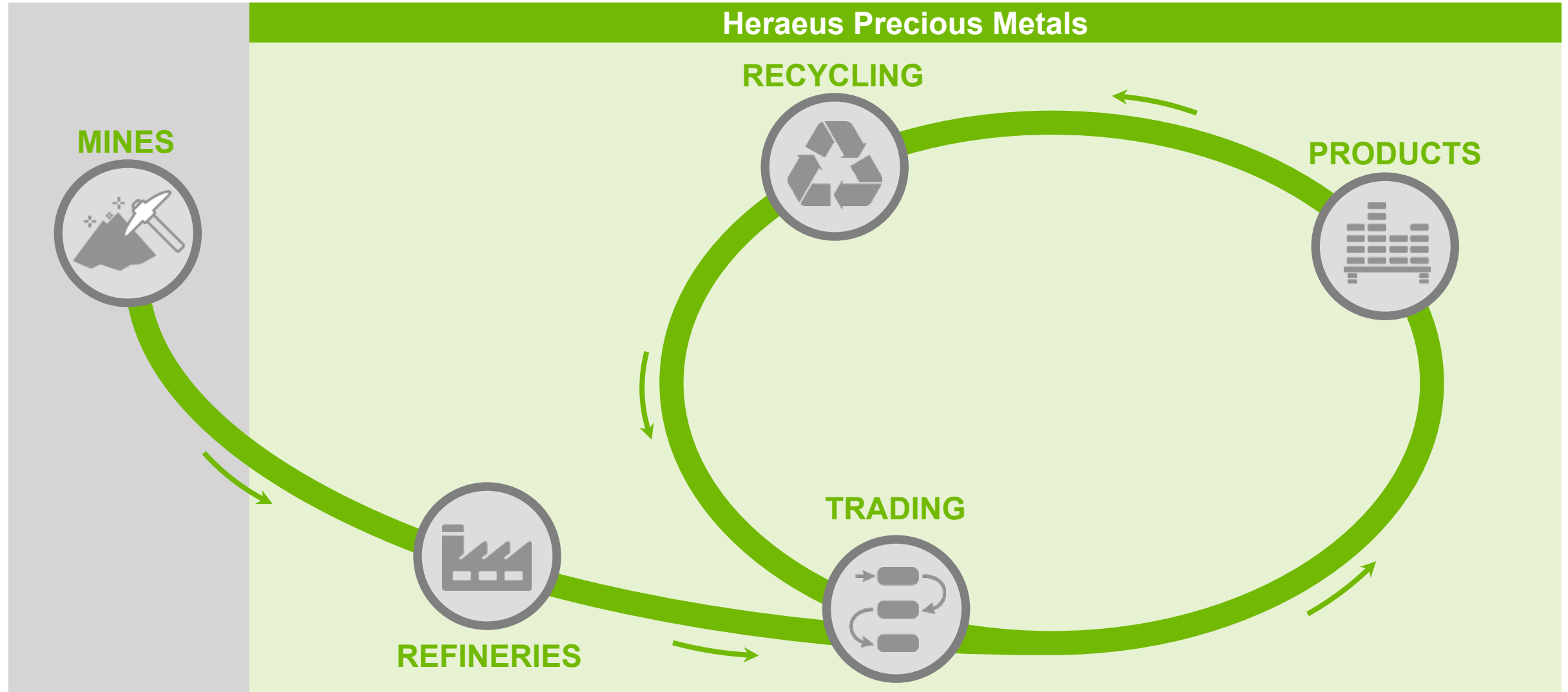
**savings**



**6.741.378 €**

- Pt price: 29,99 EUR/kg,
- Rh price: 517,47 EUR/kg  
(09/09/2021)

## PRECIOUS METALS VALUE CHAIN



## IN A NUTSHELL



**New alloy.**



**Adressing the need of  
decreasing Rhodium content.**



**Potential of significant  
savings in precious metal  
invest.**





## OUTLOOK



**New edition to the DPH family:  
DPH STRONG.**



**Extreme temperatures, very high  
mechanical loads.**



**Outperforming current state of  
the art ODS alloys.**

## HERAEUS MATERIAL DATABASE

Highest efficiency in material choice.



### Quick and easy access

- No registration required, browse materials right away



### Transparency

- Find the right material by setting filters



### Comparability

- Compare up to four materials and find out how they perform



[herae.us/material-database](https://herae.us/material-database)

The screenshot shows the Heraeus Precious Metals website interface. The top navigation bar includes links for Home, About Heraeus, Business Challenges, Products and Solutions, Precious Metal Services, Precious Metal Prices, Charts, Supply & Demand, Market Reports, Press & News, Trade Fairs & Events, and Contact. The main content area features a header image with chemical symbols Rh, Pt, Au, Pd, and Ir. Below this, the material 'PtRh5 DPH / Pt-5%Rh DPH' is highlighted. The page lists general designation, description, applications (glass manufacturing, drain bushings, glass fibre bushings, semi-finished products), product forms (wire, tube, sheet), and density (20.59 g/cm³). A 'Details' section includes 'Forming Processes' (ductile, formable, machinable) and 'Electrical' properties. A graph shows 'Electric Resistivity (mΩ·cm)' vs 'Temperature (°C)' from 0 to 1400°C. The 'Sources Electrical' section is marked as 'Unmeasured'. A QR code is located at the bottom left of the page.





**MANY THANKS FOR  
YOUR PARTICIPATION.**

Heraeus

Platinum

999.5

