

Heraeus



DPH Dispersion Hardened Platinum Materials

W. C. Heraeus

How platinum is enhanced

Dispersion hardened platinum (DPH) – the synthesis of technological excellence and experience

W. C. Heraeus can look back on more than 150 years of experience in processing precious metals. Since its foundation, the company has devoted itself to platinum and the platinum group metals.

Other processes besides solid solution hardening, i. e. alloying with other metals such as gold, iridium or rhodium, are employed in order to improve the properties of platinum under extreme conditions.

W. C. Heraeus has developed the process of dispersion hardening (DPH) and continually optimised it through close co-operation with customers in industry and in analytical laboratories.

DPH materials are specially suitable for areas of application where long service life, high temperature strength, resistance to corrosion and stability against deformation are critical.

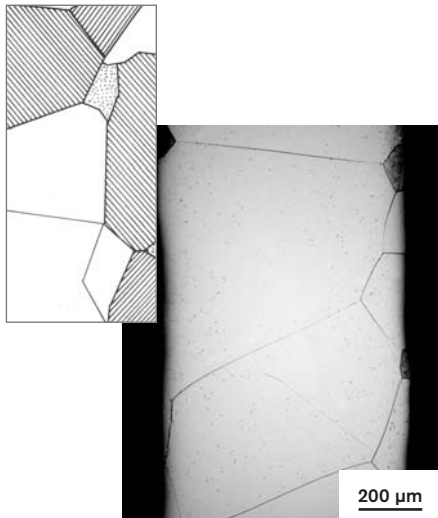
The higher strength of the material also has a stabilising effect on the equipment manufactured from it. Strengthening components of e. g. molybdenum, ceramics or refractory metals thus become effectively redundant. Large components profit from the combination of strength and ductility.



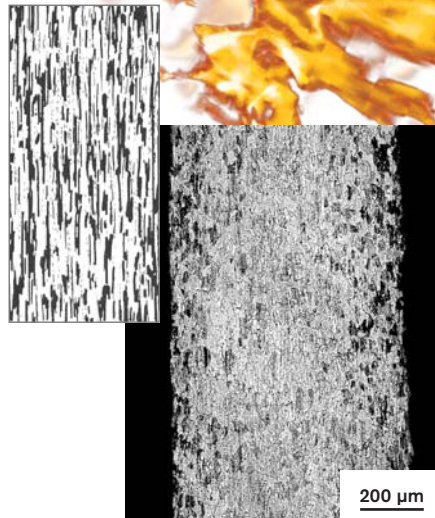
A new class of materials

DPH in comparison

The fine crystalline structure of DPH remains unchanged after 30 hours exposure at 1600°C in contrast to conventional platinum materials.



PtRh10
after 30 hours at 1600°C



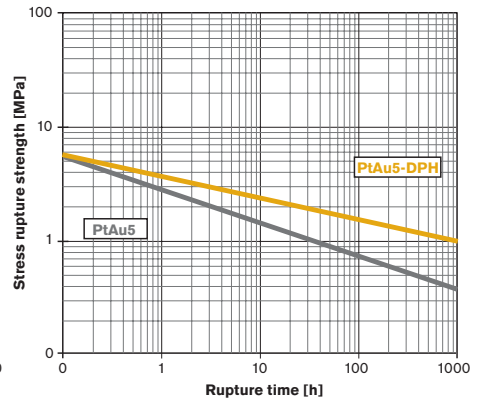
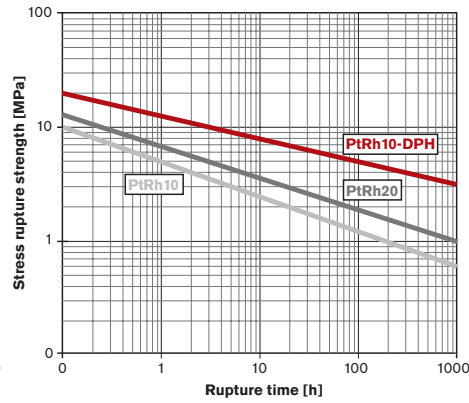
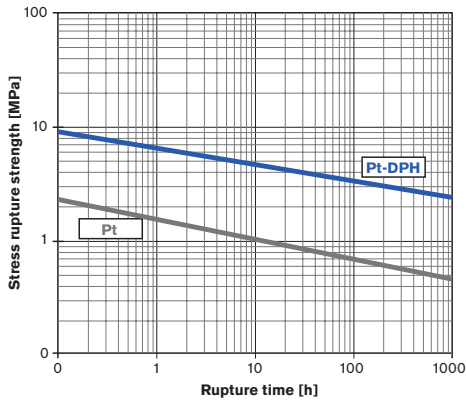
PtRh10-DPH
after 30 hours at 1600°C

The inclusion of finely distributed zirconia as a dispersoid impedes grain growth to a temperature just below the melting point. Due to the modified, finer microstructure, DPH is considerably less sensitive to corrosion processes along the grain boundaries than comparable materials. This ensures better corrosion resistance.



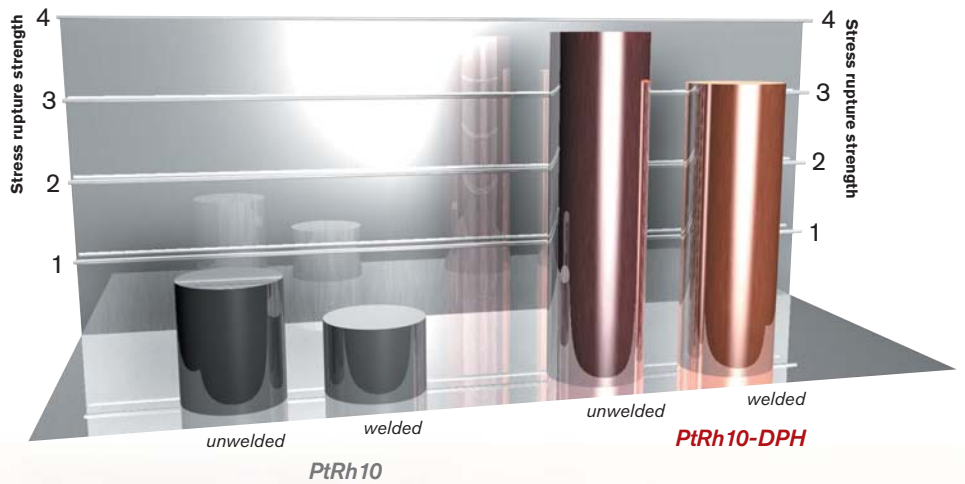
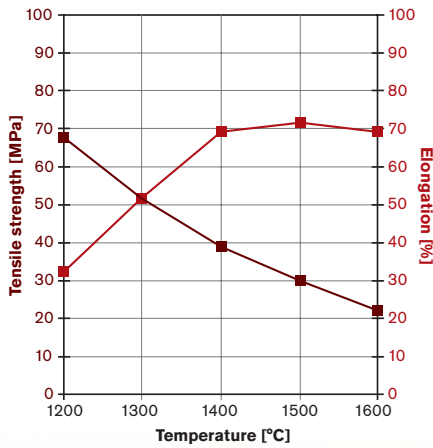
High temperature strength and creep behaviour

High temperature strength (1600°C)



Exceptional strength and good formability PtRh10-DPH

Optimal weldability Stress rupture strength, 1000 hours, 1450°C [MPa]

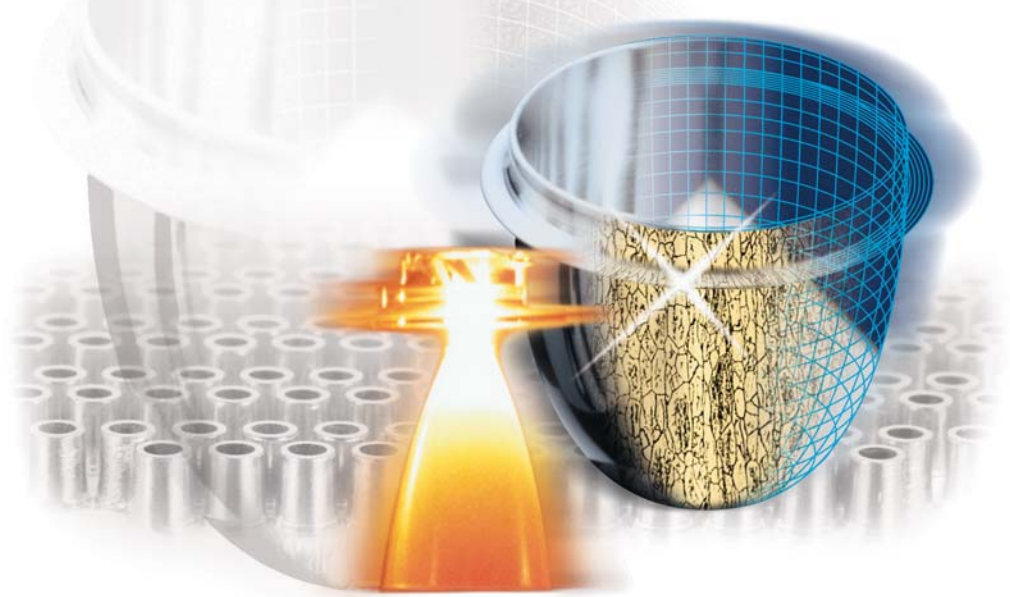


Besides the special crystalline structure and the exceptional high temperature strength, DPH distinguishes itself through its excellent weldability.

This is a considerable advantage for complex structures which have to withstand the toughest requirements. The high strength ($\geq 80\%$) in the welding seams is unique in this class of materials.



Advantages which pay



Economical use of precious metal together with excellent material properties

Nowadays we cannot imagine the glass industry or a laboratory which does not use the material platinum. Feeder systems, stirrers, plungers, crucibles and dishes are only a few of the multiplicity of applications for this exceptionally resistant precious metal.

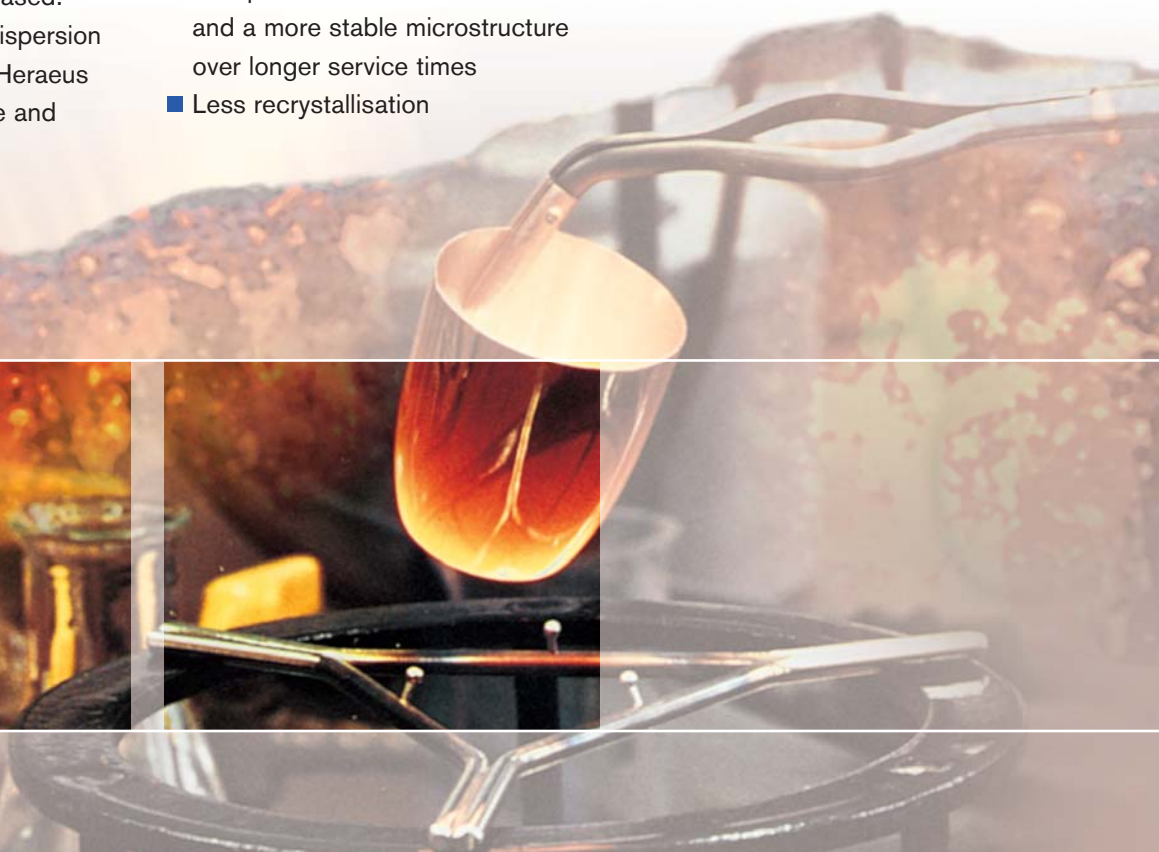
Due to the never ceasing development of products and production processes, demands on the platinum materials being used have also increased. With the development of dispersion hardened platinum, W. C. Heraeus has taken up this challenge and

has adapted the essential material properties to meet today's requirements. Through a special process W. C. Heraeus has created with DPH a new class of materials and has optimised it for special applications:

- High strength with good ductility in the high temperature range (up to 1700° C)
- Excellent weldability while the strength is maintained
- Exceptional corrosion resistance and a more stable microstructure over longer service times
- Less recrystallisation

These characteristics allow for longer service lives for the individual components and permit the precious metals to be used more economically, for instance through reduced wall thicknesses.

As a result of their optimised combination of material properties, Heraeus DPH alloys achieve a distinct improvement in economic viability.



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