Creep Test Results on Iridium, Rhodium and Platinum Tested in Air				
Specimen	Temperature °C	Stress for instantaneous failure p.s.i. (f_o)	Stress for 100 hour life p.s.i. (f_{100})	$\frac{f_{100}}{f_o}$
25 μ sheathed Ir	1500	16,784	1,840	0.11
100 μ sheathed Ir		12,445		
50 μ sheathed Rh		4,267	825	0.19
Pure Platinum		1,337		
25 μ sheathed Ir	1250	25,320	5,405	0.21
100 μ sheathed Ir		17,420	7,681	0.44
50 μ sheathed Rh		8,534	1,920	0.22
Pure platinum		1,991	554	0.28

Oxidation Effects

Although interdiffusion between the iridium and platinum occurred at high temperatures, rapid oxidation of the iridium inside the sheath tended to prevent complete disappearance of the platinum. After several hours at temperature the grain boundaries of the platinum tended to crack open, probably because of oxygen attack upon the iridium they had dissolved. These cracks allowed free access of air to the iridium core which was rapidly volatilised. At high stresses the grain boundaries pulled apart with no evidence of ductility. At low stresses the solid iridium core became much reduced in diameter. It was surrounded by a coral-like tracery of iridium fronds supported by, or supporting on their outer extremities, a loosely adherent cracked platinum sheath.

This simple expedient of platinum sheathing has given Reinacher results which tend to suggest that the intercrystalline failure of iridium is largely attributable to oxygen attack. Mordike, however, reported intercrystalline failure in vacuum. These conflicting results might be attributable to stress relief by the platinum at the iridium grain boundary, to differences in strain rates, or to the pressure of carbon vapour in Mordike's furnace. The remarkable grain refining effect of the platinum sheathing should not be ignored, and the interesting anomalies arising from Reinacher's and Mordike's results indicate considerable scope for some further investigation.

A.S.D.

References

1 G. Reinacher, *Metall*, 1963, **17**, 699-703
2 G. Reinacher, *Metall*, 1964, **18**, 731-740
3 B. L. Mordike and C. A. Brookes, *Platinum Metals Rev.*, 1960, **4**, 94-99

Influence of Purity on the Work-hardening of Platinum

A comprehensive study of the work-hardening, recovery and recrystallisation of three grades of platinum has been reported by Dr Ernst Raub, of the Forschungsinstitut für Edelmetalle (*Z. Metallkunde*, 1964, **55**, (9), 512). Data were obtained for technically pure (> 99.5 per cent purity), chemically pure (> 99.9 per cent) and physically pure platinum (> 99.99 per cent) after various cycles of cold working and annealing.

Physically pure platinum began to recover after heavy cold working at about 200°C, and recovered rapidly at 250°C. The temperature ranges of recovery and recrystallisation were found to rise with increasing impurity content. Strength at elevated temperatures was increased at higher impurity levels, independently of microstructure and grain size.