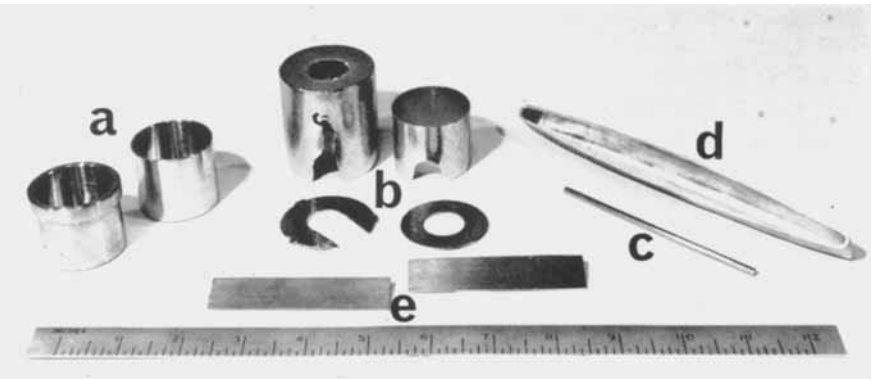

Fig. 3. Platinum metal ware used in the growth of oxide single crystals
a) Iridium and platinum crucibles *b) Iridium heat shields*
c) Iridium rod *d) Iridium boat* *e) Iridium strips for float zoning*

single crystals. For example, certain impurities in calcium tungstate can be removed by zone-refining this compound in an iridium boat, again using radio-frequency heating as the source of power. The high temperature thermocouple materials such as iridium: iridium-rhodium have also been useful in determining the phase relationships in mixed garnet systems such as $Y_3Al_5O_{12} - Gd_3Al_5O_{12}$ and $Y_3Al_5O_{12} - Dy_3Al_5O_{12}$, where the melting points lie within the temperature range 1850° to 1970°C.

The metals platinum, rhodium and iridium thus play an important part in the major growth techniques now used for forming single crystals of high melting point oxides, many of which act as host lattices for laser ions.

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Ruthenium as a Methanation Catalyst

The value of natural gas for domestic heating and for industrial power has long been recognised, but in areas of the world not endowed with a convenient supply some alternative economic source of methane is required. The steam-reforming of higher hydrocarbons (for example, "light petroleum distillate" obtained from mineral oil), or the reaction of steam with carbon, yields a mixture of carbon monoxide and hydrogen from which methane may be produced by catalytic hydrogenation. What is then required is a catalyst that will perform this hydrogenation economically, and this must be a catalyst which is not particularly susceptible to poisoning by carbon monoxide.

A recent report from the United States Bureau of Mines (J. F. Shultz, F. S. Karn and R. B. Anderson, U.S. Dept of the Interior, Bureau of Mines, R.I. 6974, July 1967) has re-emphasised the outstanding catalytic properties of ruthenium for carbon monoxide hydrogenation. The authors compare catalysts containing ruthenium, rhodium, platinum, palladium and osmium, but of all the catalysts examined only the ruthenium on alumina catalyst was adequately active. It achieved complete reaction at 220 to 240°C, whereas palladium and platinum failed to do this even at 500°C. The kinetics of the reaction using the ruthenium catalysts were examined in some detail: the rate increases with increasing hydrogen pressure and is slightly decreased by increasing carbon monoxide pressure. High molecular weight products appeared only when the H_2/CO ratio in the feed gas fell below two; catalyst poisoning only became important when this ratio fell below unity. The authors concluded that the use of ruthenium for carbon monoxide methanation was economically feasible.

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