fraction of gold increases. Overall, the optimum composition for the catalyst appears to be about $Pt_{0.7}Au_{0.3}$.

The increased yields of hydrogen obtained with increasing mol fraction of gold are attributed to inhibition of hydrogenation of the reactants by surface gold atoms. With mol fractions of gold exceeding 20 per cent, hydrogen is not consumed upon prolonged irradiation although this is a serious problem for colloids containing little or no gold. Many of the platinum atoms on the colloid surface are prevented from functioning as active catalytic hydrogen evolving sites because of specific adsorption. The adsorbate may be H· atoms, MV^{2+}, $MV^{+\cdot}$ or surfactant used to protect the colloid against flocculation. Incorporating gold atoms into the colloid surface dilutes platinum-platinum co-ordination sites where specific adsorption occurs, allowing surface platinum atoms to operate as active hydrogen sites.

In hydrogen-saturated aqueous solution at pH4 containing colloidal platinum (2×10^{-4} mol/dm^3), hydrogenation of MV^{2+} occurs very slowly. The reducing radical $MV^{+\cdot}$, however, is hydrogenated readily under ambient conditions and it is apparent that this reaction is responsible for consumption of hydrogen during photolysis. The rate of hydrogenation of $MV^{+\cdot}$ (R_{MV}), as catalysed by the various colloids, was measured by electrochemical methods. It was found that R_{MV} decreased significantly with increasing mol fraction of gold. The inhibition of hydrogenation of $MV^{+\cdot}$ on the bimetallic particles is a consequence of the decreased mobility of H· atoms (8) and the increased energy of adsorption of H_2 (9, 10).

This study has shown that the use of bimetallic platinum-gold colloids can improve the rates and yields of hydrogen evolution from photosystems in which one or more of the reactants is susceptible towards hydrogenation. This arises because gold atoms at the surface of the colloidal particle inhibit specific adsorption and hydrogenation of the reactants. This behaviour, which is well known for macroscopic catalysts (11, 12), shows the advantages that may be gained by using alloys in place of pure metals.

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Cleavage in Iridium Crystals

As the only metal with good mechanical properties in air at temperatures above 1600°C, iridium is used for the crucibles in which presintered mixed oxides are melted during the growing of high purity single crystals for electronic applications. Fabrication techniques have been developed to enable these crucibles to be manufactured to the required high standard, none-the-less the factors that govern the deformation of iridium are not yet fully established.

A recent letter from the Department of Physics of the Urals State University, U.S.S.R., where the deformation and fracture of metals is a traditional subject of research, contributes to the topic with a discussion of the possible cause of cleavage in iridium single crystals (P. Panfilov, A. Yermakov and G. Baturin, *J. Mater. Sci., Lett.*, 1990, **9**, (10), 1162–1164).