The use of platinum alloyed bimetallic catalysts to manipulate product distributions during the oxidation of polyols.

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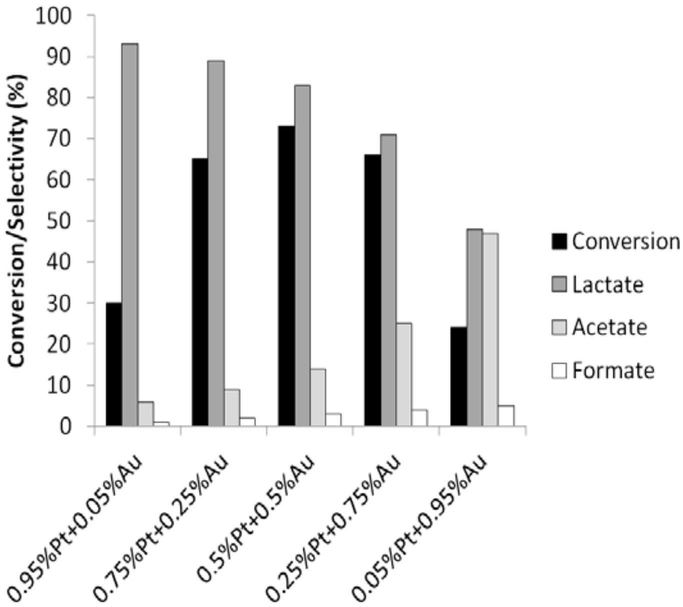

The valorisation of polyols has been the focus of extensive research in recent years, with a large proportion of this work focusing on the oxidation of glycerol, it has been shown that glycerol can be oxidized under mild, green conditions[1, 2]. These catalysts show similar activity for the oxidation of propane and butane diols. We have shown that by tuning the catalytic parameters such as the choice of alloying metal, support and metal ratio both the conversion and major product selectivity can be enhanced. In certain cases the choice of alloying metal can drive the reaction towards a particular product. These catalysts can be applied to polyol oxidations using water as a solvent. Figure 1 shows the oxidation of 1,2-propanediol in water and shows that tuning the metal ratio can lead to good conversion with simultaneous retention of selectivity to lactic acid, which can be used to form biodegradable polymers.

These catalysts from the oxidation of glycerol, 1,2 propanediol and 1,3-propanediol can also be used for the oxidation of various butanediols, these optimized catalyst was active for the oxidation for all the butanediols tested. 1,2-butanediol formed 2-hydroxybutyric acid and 1-hydroxy-2-butanone which are used as flavour and fragrance agents. 2,3 butandiol was selectively oxidised to butandione also used as a flavouring agent. Finally the oxidation of 1,4 butanediol formed butyrolactone as the major product which is used as a chemical intermediate in agrochemicals, pharmaceuticals and dyes.

In summary the recent development of platinum based catalysts presents opportunities for increased conversion, reactions under mild conditions and the manipulation of product distribution. The origins of these effects will be discussed.

1. A. Villa, G. M. Veith and L. Prati, *Angewandte Chemie International Edition*, 2010, **49**, 4499-4502.
2. G. L. Brett, Q. He, C. Hammond, P. J. Miedziak, N. Dimitratos, M. Sankar, A. A. Herzing, M. Conte, J. A. Lopez-Sanchez, C. J. Kiely, D. W. Knight, S. H. Taylor and G. J. Hutchings, *Angewandte Chemie International Edition*, 2011, **50**, 10136-10139.