

Supplementary Information

Gold-Palladium Colloids as Catalysts for Hydrogen Peroxide Synthesis, Degradation and Methane Oxidation: Effect of the PVP Stabiliser

Simon J. Freakley^{a*}, Nishtha Agarwal^b, Rebecca U. McVicker^b, Sultan Althahban^{c,d}, Richard J. Lewis^b, David J. Morgan^b, Nikolaos Dimitratos^e, Christopher J. Kiely^{b,c} and Graham J. Hutchings^{b*}

^a *Department of Chemistry, University of Bath, Claverton Down, Bath, UK, BA2 7AY*

^b *Cardiff Catalysis Institute and School of Chemistry, Main Building, Park Place, Cardiff, CF10 3AT, UK*

^c *Department of Materials Science and Engineering, Lehigh University, 5 East Packer Avenue, Bethlehem, PA 18015, USA.*

^d *Department of Mechanical Engineering, Jazan University, Jazan 82822, Saudi Arabia.*

^e *Department of Industrial Chemistry, Alma Mater Studiorum-University of Bologna, Viale Risorgimento, 40136, Bologna, Italy*

* Co-corresponding authors s.freakley@bath.ac.uk, hutch@cardiff.ac.uk

Surface Atom Determination

The number of surface atoms in each reaction was determined based on the experimentally determined particle size distributions using TEM and applying a model of atom packing below for all

Particle size / nm	Total Atoms in Particle	Surface Atoms in Particle
1.5	61	49
2.5	267	138
3.5	707	273
4.5	1466	453
5.5	2624	679
6.5	4259	952
7.5	6449	1271
8.5	9272	1636
9.5	12801	2049

catalysts.

Each reaction contains 0.66×10^{-6} mol metal and therefore was approximated to contain 3.9×10^{17} metal atoms. Using the packing model the number of particle at each size is scaled to give the same total number of metal atoms according to the TEM derived particle distribution. From this a total number of surface atoms is derived according to the number of particle at each size and the fraction of atoms in that particle that are at the surface.

The following values are used in the calculations of rates in the manuscript

Catalyst	Mean Particle	Total	Surface Atoms / %	Relative to
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	Size / nm	Surface Atoms per reaction		Supported Catalyst
1% AuPd / TiO ₂	4.1 ± 1.3	5.7 x 10 ¹⁶	15	-
AuPd colloid (PVP : M = 1.2)	3.0 ± 1.3	1.2 x 10 ¹⁷	31	2.1
AuPd colloid (PVP : M = 0.005)	6.0 ± 1.9	8.5 x 10 ¹⁶	21	1.5
AuPd colloid (PVP : M = 0.1)	2.8 ± 1.8	1.3 x 10 ¹⁷	33	2.3
AuPd colloid (PVP : M = 20)	1.9 ± 1.3	1.4 x 10 ¹⁷	36	2.5