

Designing Pd-based supported bimetallic catalysts for environmental applications

Ewa NOWICKA^{1‡}, Meenakshisundaram SANKAR^{2‡}

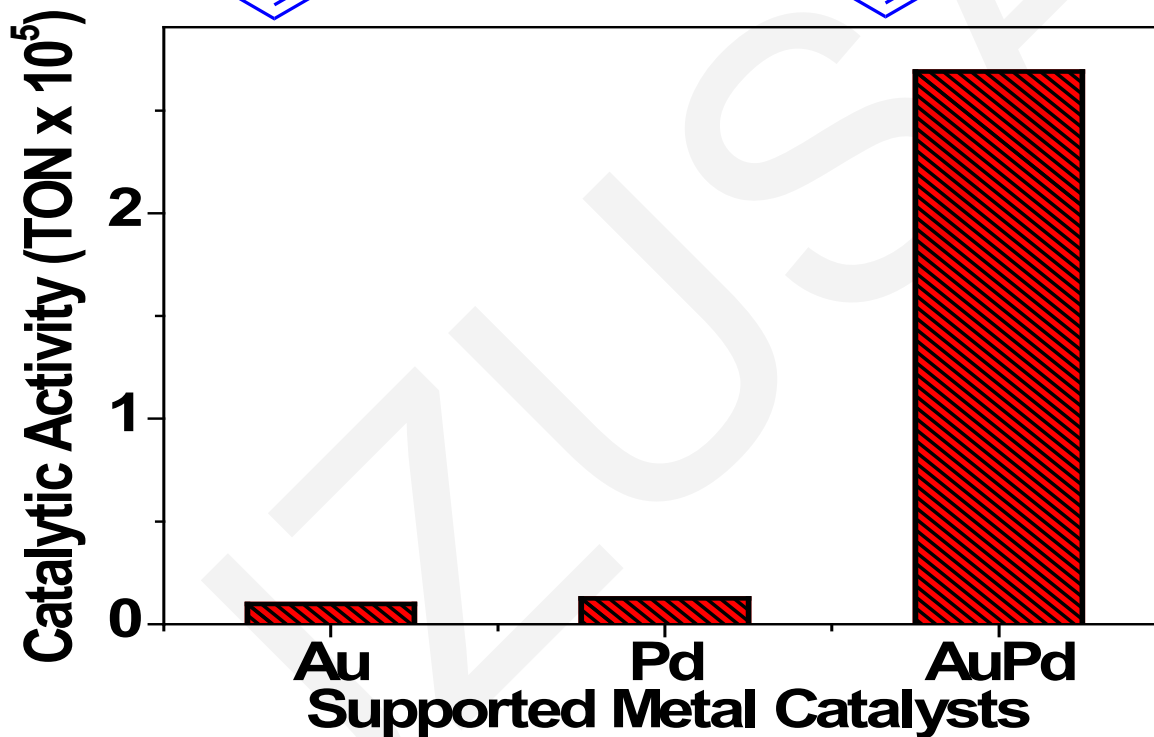
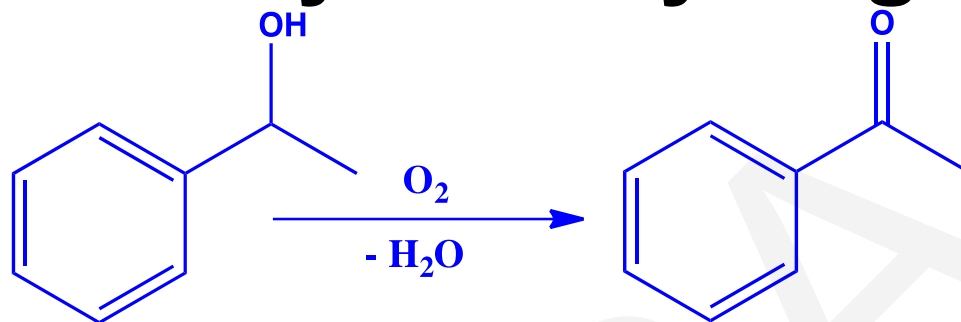
¹ *Technical University Berlin, Faculty of Chemistry, Strasse des 17. Juni 124, 10623 Berlin, Germany*

² *Cardiff Catalysis Institute, School of Chemistry, Cardiff University, Main Building, Park Place, Cardiff, CF10 3AT, UK*

‡ E-mail: nowicka@tu-berlin.de, sankar@cardiff.ac.uk

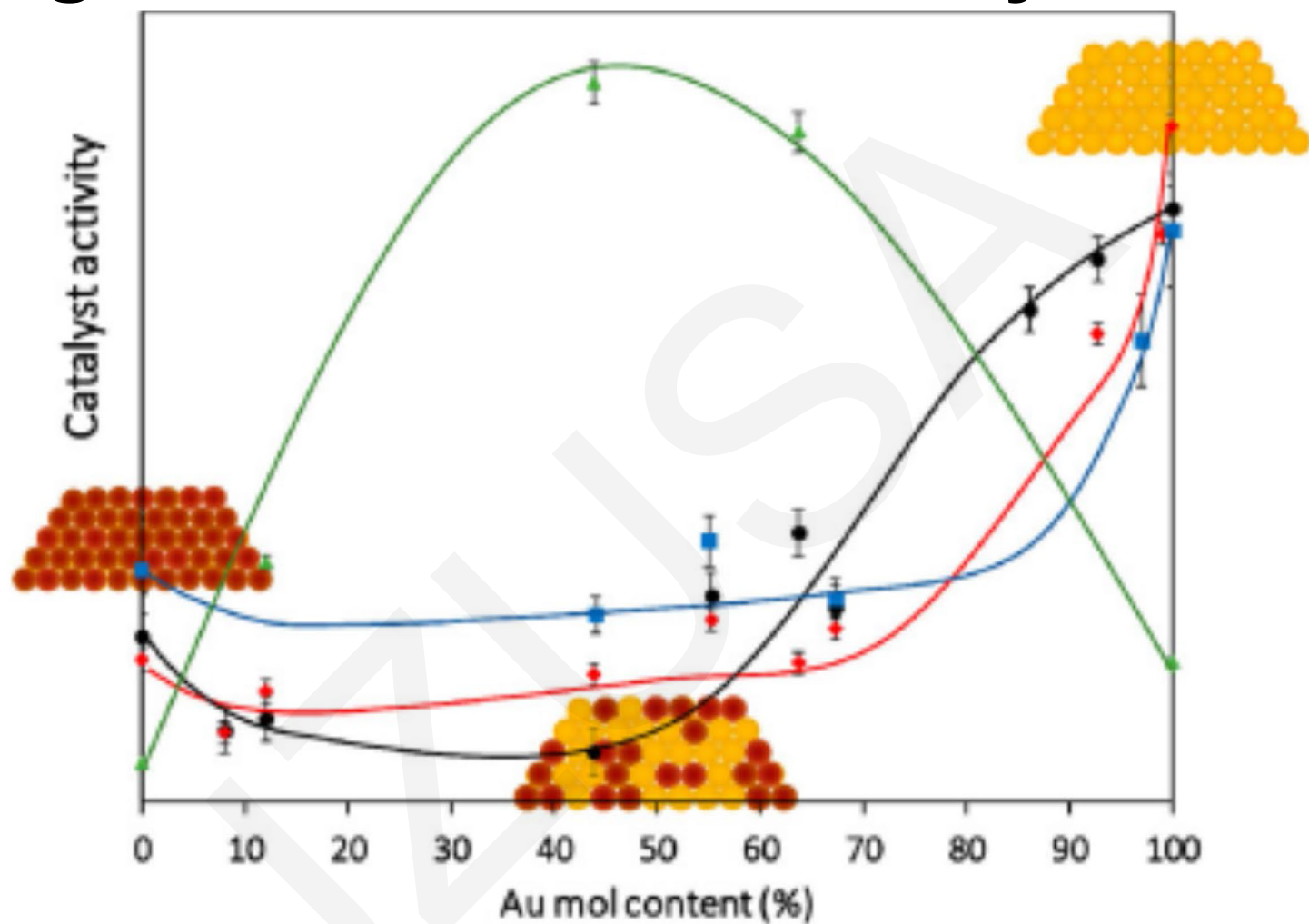
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Bimetallic Catalysts – Synergistic Effect



Bimetallic catalysts have much higher catalytic activity, selectivity and stability compared to their monometallic analogues – Synergistic effect

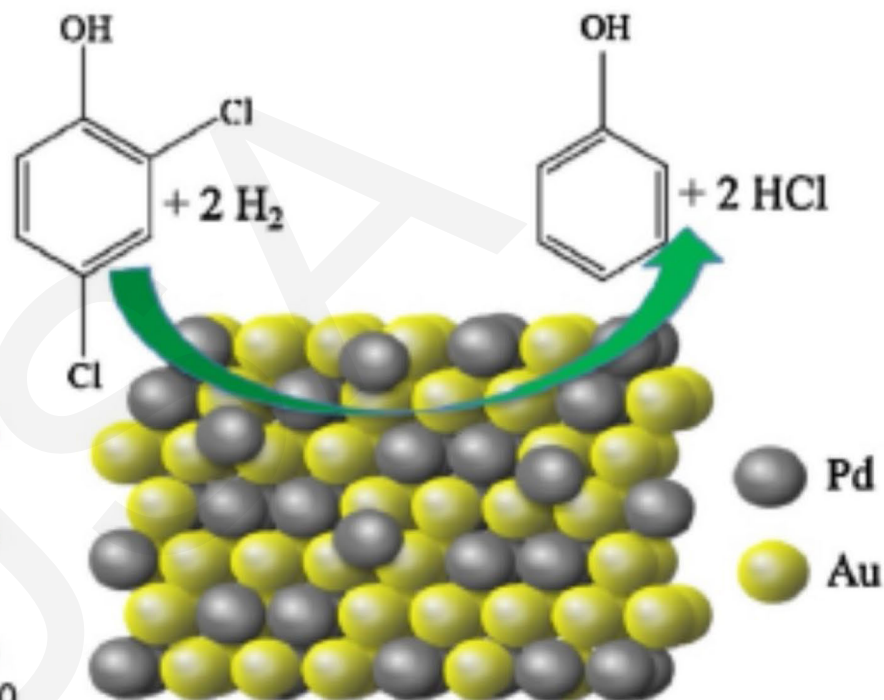
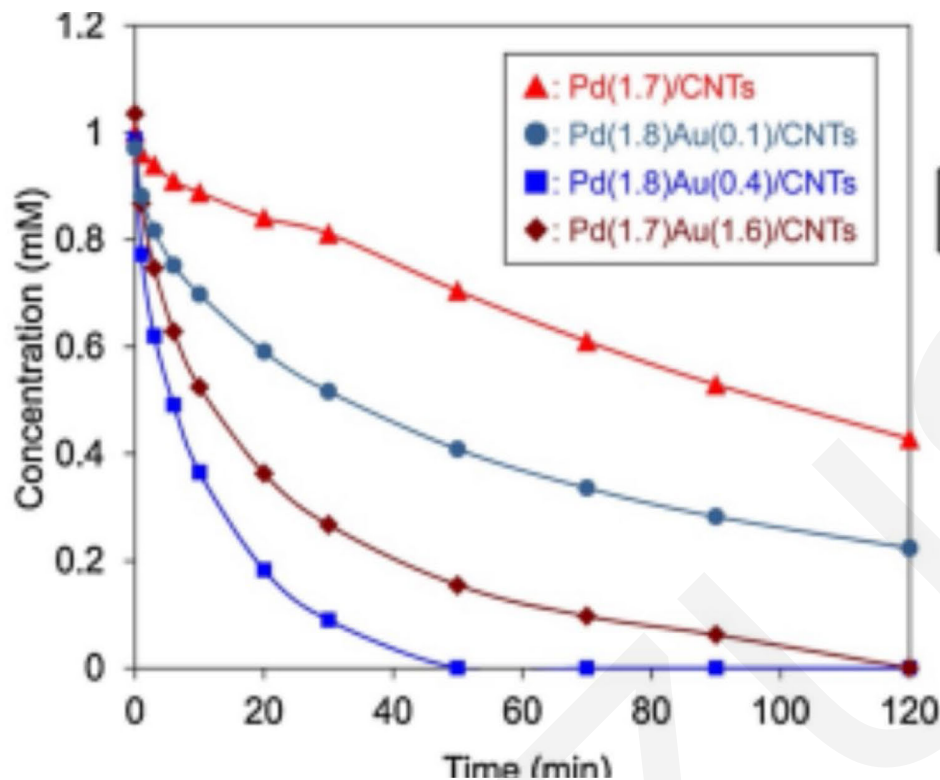
Synergistic Effect – Not Always Positive



Water-gas shift **CO oxidation** **Formic acid decomposition** **Benzyl alcohol oxidation**

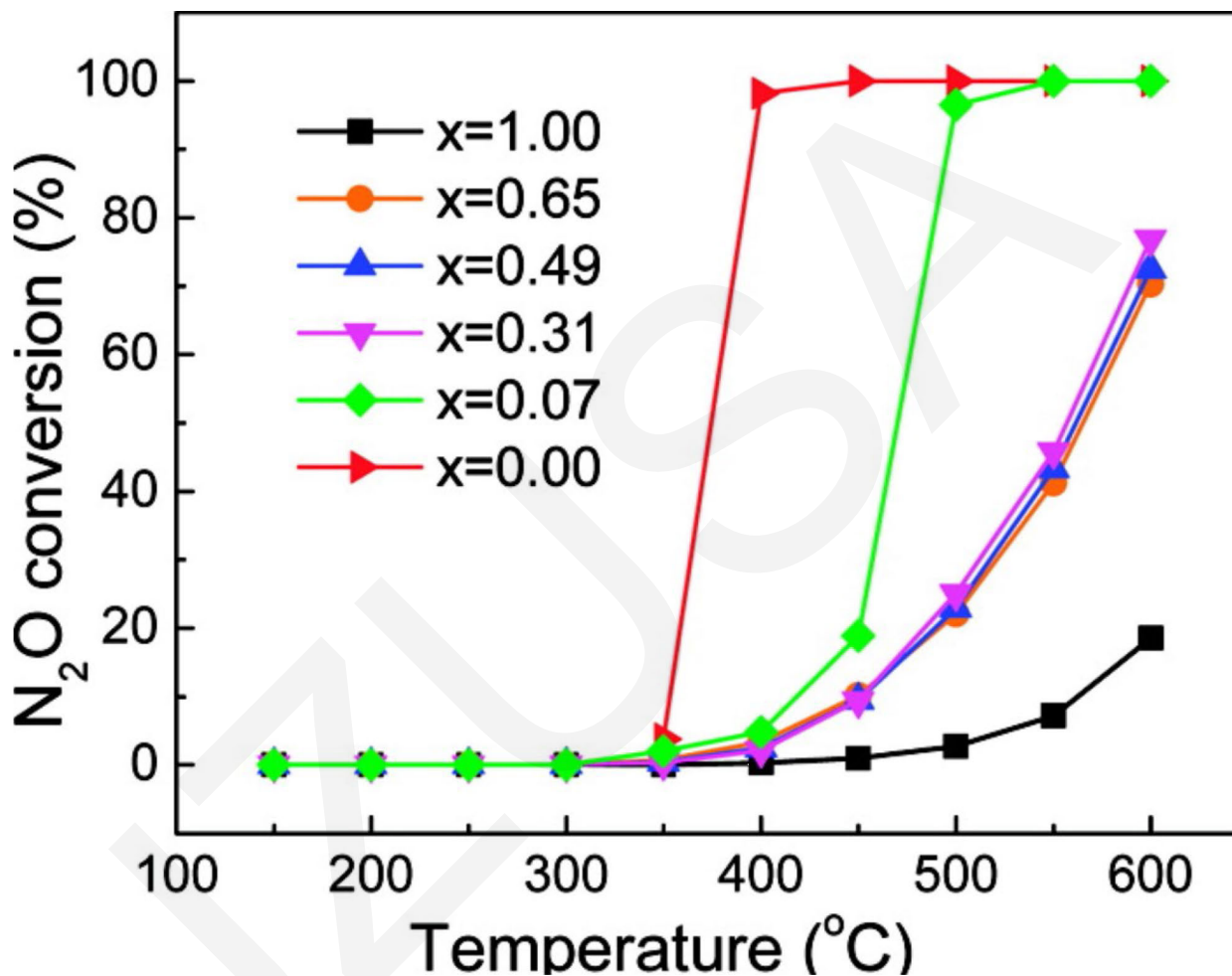
Bimetallic AuPd catalysts are less active compared to monometallic Pd catalysts for CO oxidation, water gas shift reaction – Anti-synergistic effect

AuPd Bimetallic - Hydrodechlorination



Bimetallic AuPd catalysts were prepared by complexing – reducing agent method. The bimetallic particles have random alloy structure and very small particle size compared to the monometallic particles.

AuPd Bimetallic – N₂O decomposition



Au_xPd_{1-x} nanoparticles supported on SBA-15 were prepared using adsorption – reduction method. The resultant catalyst contains small particles of AuPd mixed together

Conclusion

Pd based bimetallic catalysts are superior to their monometallic analogues

These catalysts have better activity, selectivity and stability

However not all bimetallic catalysts are better than monometallic catalysts

It is crucial to control the particle size, composition and nanostructure of these bimetallic catalysts.

New synthesis methodologies have to be developed by combining material science, spectroscopists to precisely control the above mentioned structural features.