

# Chemically Synthesised Atomically Precise Gold Clusters

## Deposited and Activated on Titania

David P. Anderson<sup>1</sup>, Rohul Adnan<sup>1,2</sup>, Jason Alvino<sup>3</sup>, Oliver Shipper<sup>3‡</sup>, Baira Donoeva<sup>1</sup>,  
Jan-Yves Ruzicka<sup>1</sup>, Hassan Al Qahtani<sup>4</sup>, Hugh. H. Harris<sup>3</sup>, Bruce Cowie<sup>5</sup>, Jade B.  
Aitken<sup>6</sup>, Vladimir B. Golovko<sup>\*1</sup>, Gregory F. Metha<sup>\*3</sup> and Gunther G. Andersson<sup>\*4</sup>

<sup>1</sup>The MacDiarmid Institute for Advanced Materials and Nanotechnology, and Department of Chemistry, University of Canterbury, Christchurch 8140, New Zealand.

<sup>2</sup>Chemistry Department, University of Malaya, 50603 Kuala Lumpur, Malaysia

<sup>3</sup>School of Chemistry and Physics, The University of Adelaide, Adelaide SA 5005, Australia

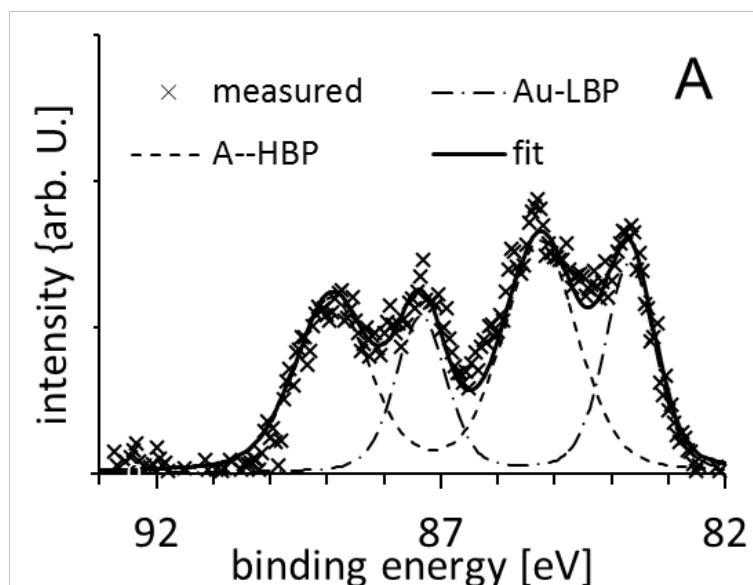
<sup>4</sup>Flinders Centre for NanoScale Science and Technology, Flinders University, Adelaide SA 5001, Australia

<sup>5</sup>Australian Synchrotron, 800 Blackburn Road, Clayton Vic-3168, Australia

<sup>6</sup>School of Chemistry, The University of Sydney, Sydney 2006, Australia

<sup>‡</sup>Current address: School of Chemistry, Bielefeld University, Bielefeld, Germany

### Electronic supplementary information (ESI)



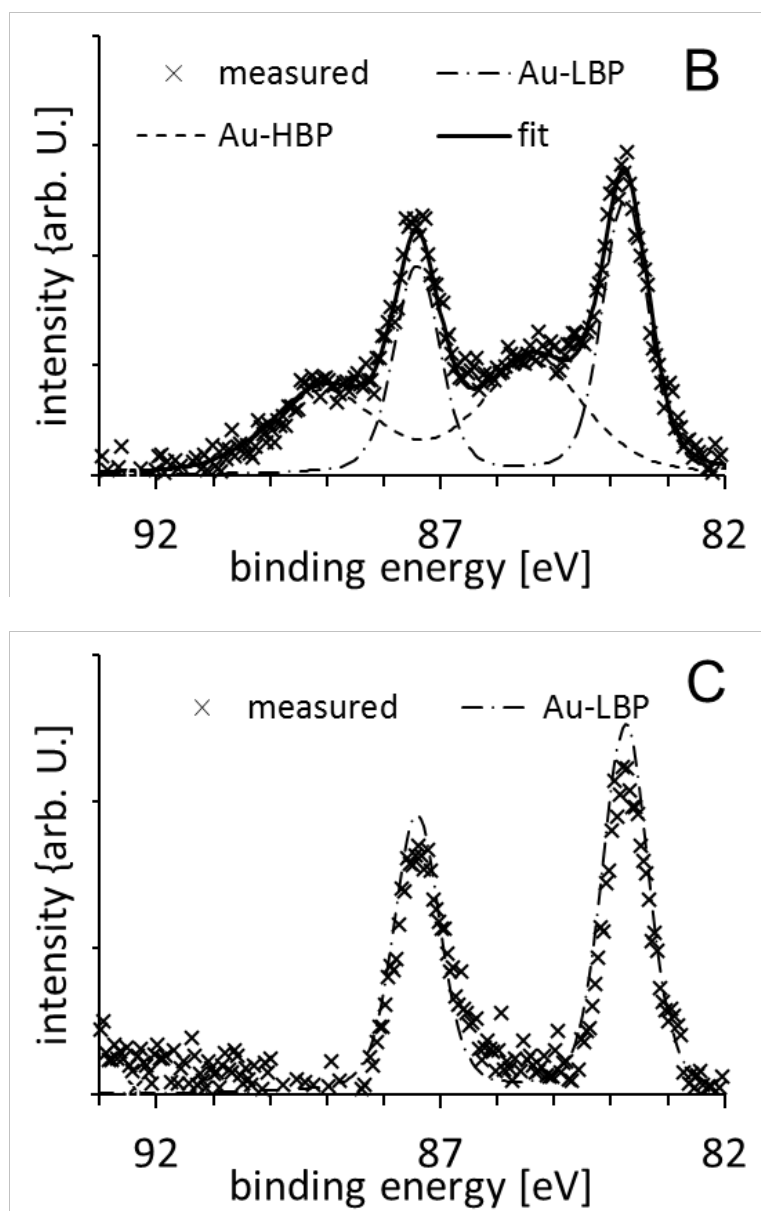


Figure S1: Fits of the Au XPS spectra of Au<sub>8</sub> gold clusters supported on anatase nanoparticles untreated (A), calcined in O<sub>2</sub> (B) and calcined in O<sub>2</sub> and subsequently calcined in H<sub>2</sub> (C).

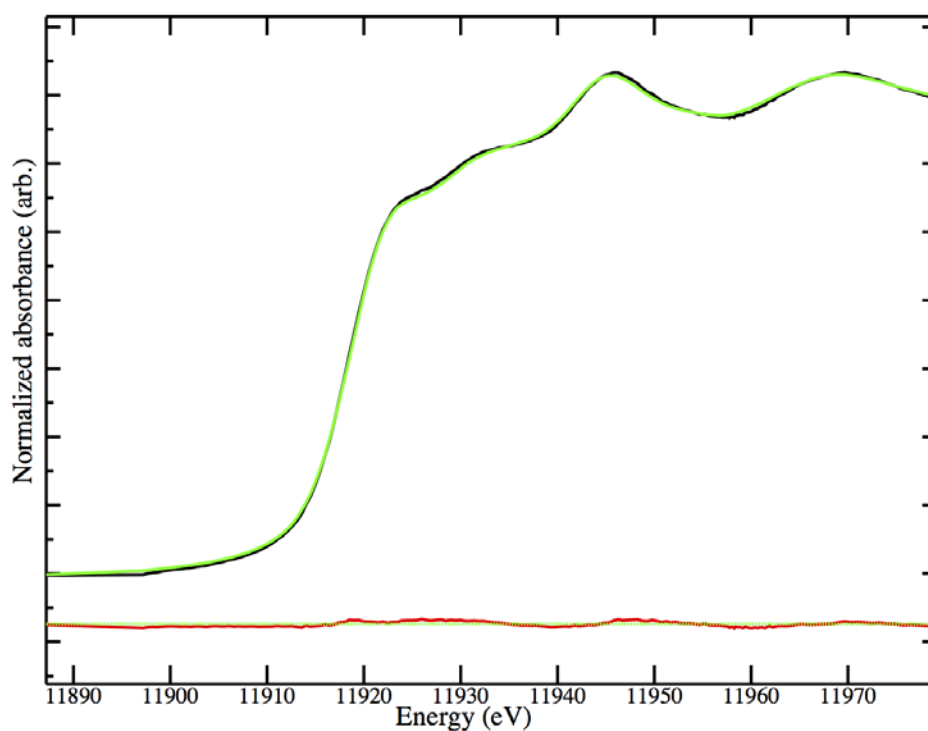


Figure S2: Comparison of Au  $L_{III}$ -edge X-ray absorption spectra of  $Au_9$  clusters supported on anatase and then calcined in  $O_2$  at  $200^\circ C$  (black trace) against that of bulk gold (green trace). The difference between the spectra is shown in red and is very close to the base line shown in green at the bottom of the figure.

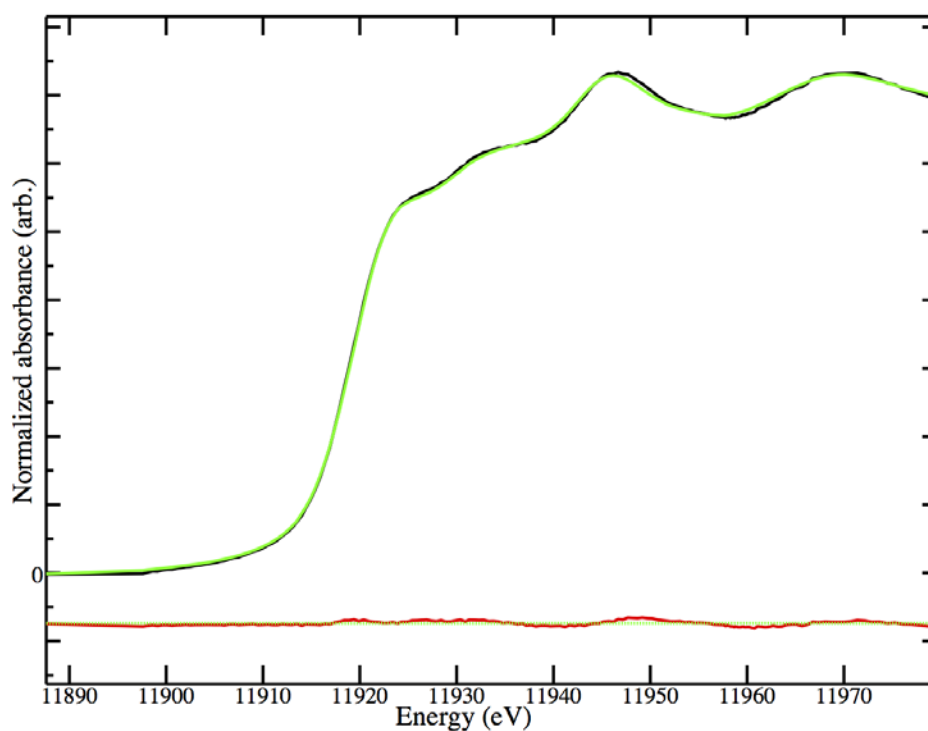


Figure S3: Comparison of Au  $L_{III}$ -edge X-ray absorption spectra of  $Au_9$  clusters supported on anatase and then calcined in  $O_2$  and subsequently  $H_2$  at  $200^\circ C$  (black trace) against that of bulk gold (green trace). The difference between the spectra is shown in red and is very close to the base line shown in green at the bottom of the figure.

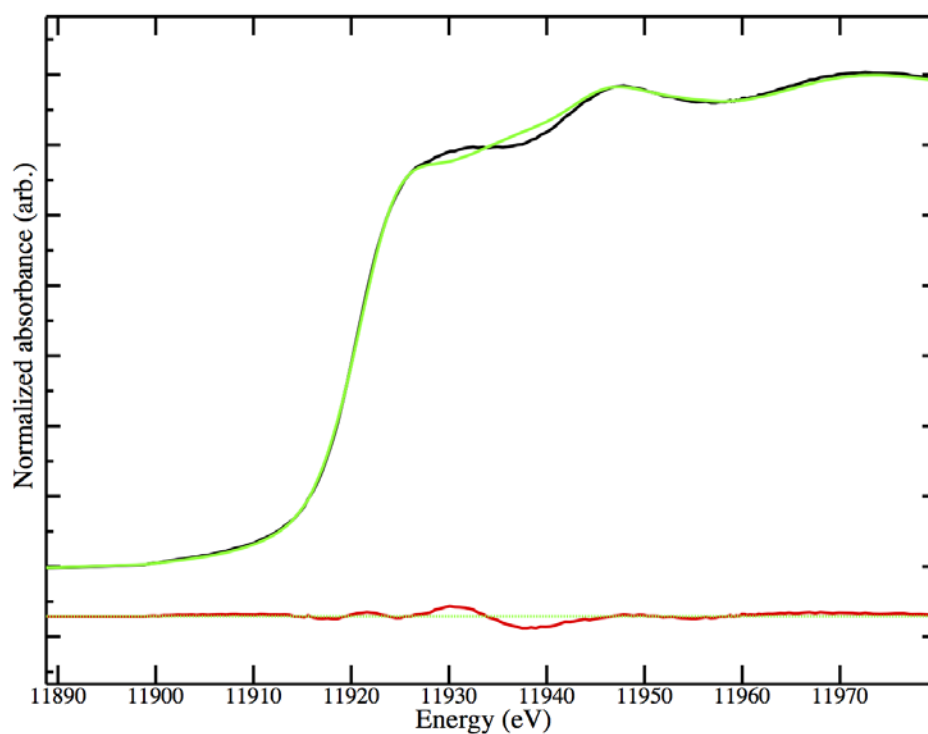


Figure S4: Au L<sub>III</sub>-edge X-ray absorption spectra of Au<sub>9</sub> clusters deposited on anatase, but untreated (black trace), against that of a fitted linear combination of the spectra of Au<sub>9</sub> clusters diluted in cellulose (61(±3)%) and bulk gold (39(±3)%) (green trace). The residual is shown in red and is close to the base line shown in green at the bottom of the figure.