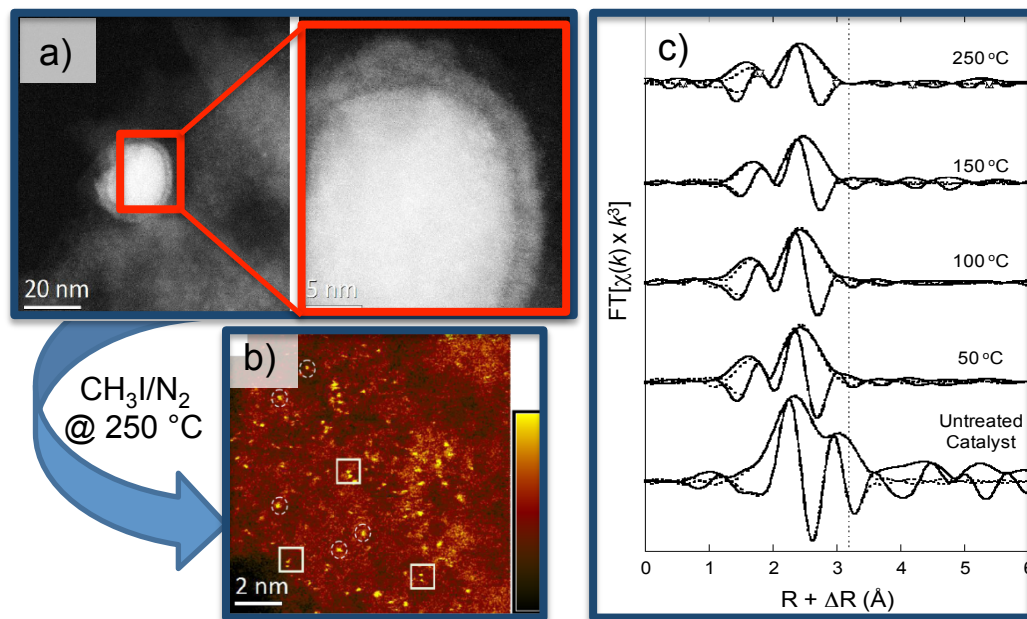


## Au dispersion

### **'Influence of Methyl Halide Treatment on Gold Nanoparticles Supported on Activated Carbon'**

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Gold particles supported on carbon when subjected to a flow of methyl iodide or bromide redisperse from large ensembles to single atoms and/or dimers of gold (Figure 1b). Methyl halide oxidizes gold leading to gradual particle dissolution (Figure 1a). The process could be carried out at temperatures as low as 50 °C (Figure 1c). The excess of halide could be removed by a post-treatment of the material with 1%  $\text{H}_2\text{O}/\text{H}_2$ , which does not influence the metal dispersion. This remarkable transformation opens the possibility of re-activating gold catalysts that lost their performance due to metal particles sintering.

The finding was proposed based on a combination of in situ (XAS), ex situ characterization (aberration corrected HAADF-TEM, XRD and XPS) and kinetic measurements. The work was a combined effort from Queen's University Belfast (UK), Paul Scherrer Institute (Switzerland), Lehigh University (USA) and Cardiff University (UK).

**Figure 1:** Au/C treated in 0.4%  $\text{CH}_3\text{I}/\text{N}_2$ .

- a) Aberration corrected HAADF – TEM Au/C after 5 min on stream @ 250 °C;
- b) Aberration corrected HAADF – TEM Au/C after 15 min on stream @ 250 °C;
- c) Fourier transformed EXAFS of Au/C after 60 min on stream at different temperatures