

EX-SITU TEM STUDY OF Au ISLANDS

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The need to adequately define the microstructure of materials under ‘real life’ conditions is of increasing importance in both the scientific and industrial communities. Over the last few years, more sophisticated *ex-situ* TEM techniques have been employed to improve this knowledge base.¹⁻⁴

A dedicated reactor system developed at ExxonMobil for “*ex-situ*” TEM was used to study the effect of temperature on Au particles deposited on a silica support (Figure 1).

In this study, Au foil was used to vapor deposit metal particles onto a standard, 200 mesh, holey-carbon-coated TEM grid. This was accomplished via a high temperature *ex-situ* treatment of the Au foil under flowing hydrogen. Subsequent to the deposition, the TEM grid was transferred under inert conditions into a Philips CM200F TEM/STEM, where randomly selected regions were characterized (Figure 2a). Several high temperature “*ex-situ*” treatments of the TEM sample at in flowing hydrogen at followed (Figures 2b and 2c). This technique provides us with the opportunity to examine of the same Au particles over time with each treatment. From these images, we observed that nearby particles were able to interact with each other and grow.

References:

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2. C.E. Klierer et. al., Proceedings Microscopy & Microanalysis **5** Supplement 2 (1999) 926
3. C.E. Klierer et. al., Proceedings Microscopy & Microanalysis **6** Supplement 2 (2000) 378
4. C.E. Klierer et. al., Proceedings Microscopy & Microanalysis **7** Supplement 2 (2001)1214

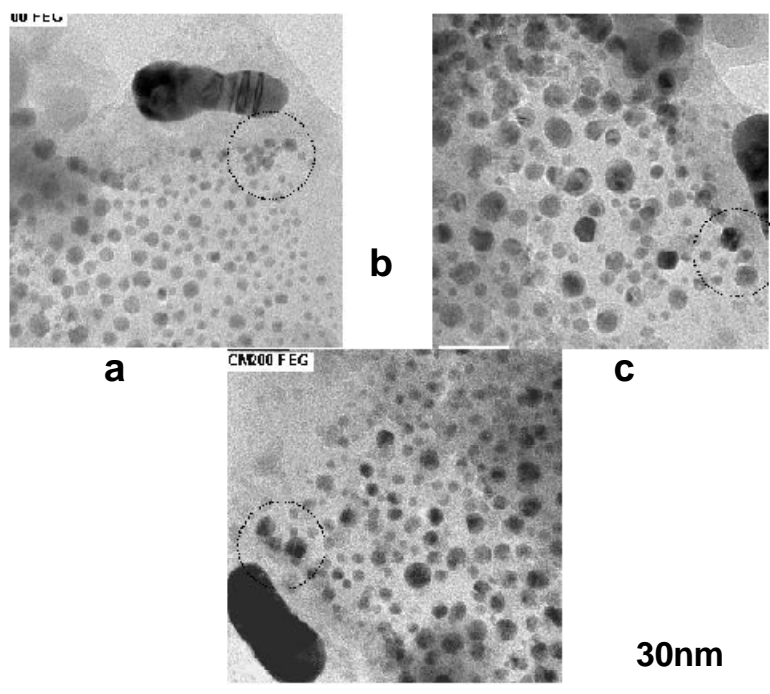
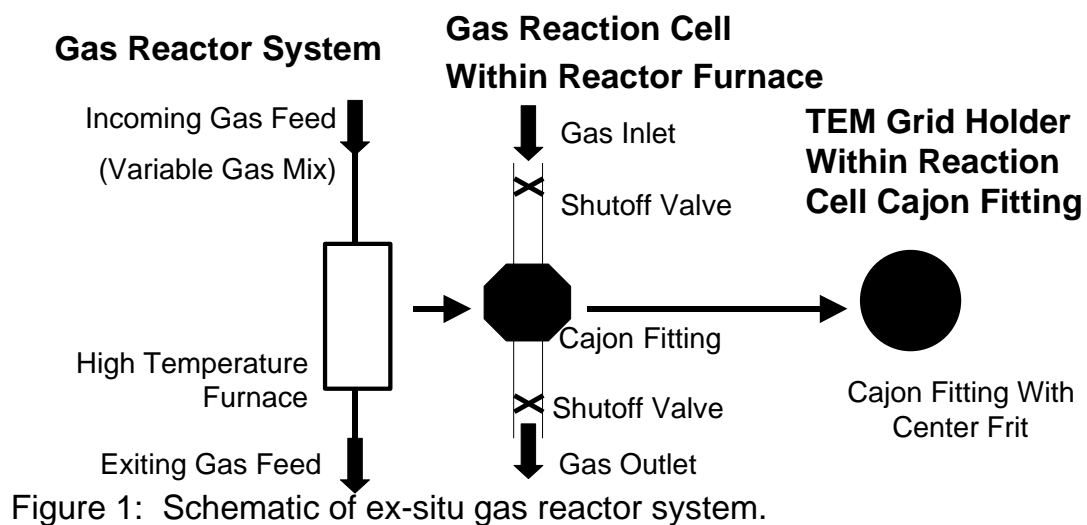


Figure 2: BFTEM image showing Au particles on SiO_2 substrate (a) 4hr. H_2 -treatment @ 450°C (b) 0.1hr. H_2 -treatment @ 600°C , and (c) 0.2hr. H_2 -treatment @ 600°C .