Supporting Information:

Surfactant Directed Growth of Gold Metal Nanostructures by Chemical Vapour Deposition

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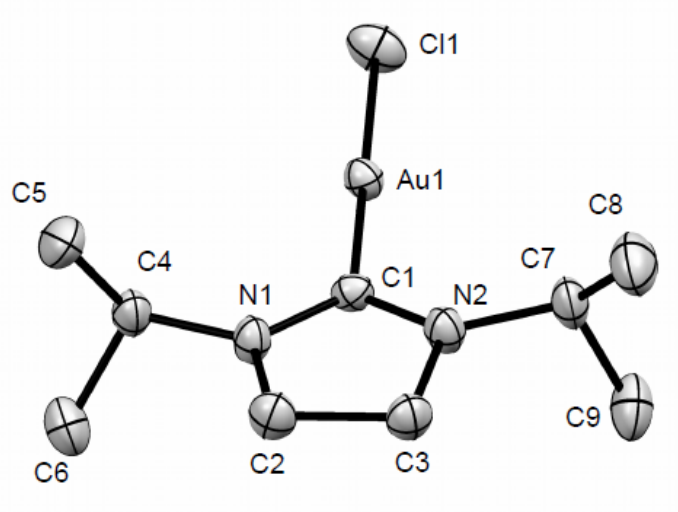

Figure S-1: Single crystal X-ray diffraction structure of **1**-Cl. Heating a light suspension of the compound in toluene and allowing to stand over 1 week produced a single rectangular crystal which was used for structure determination. Ellipsoids shown at 50% probability.

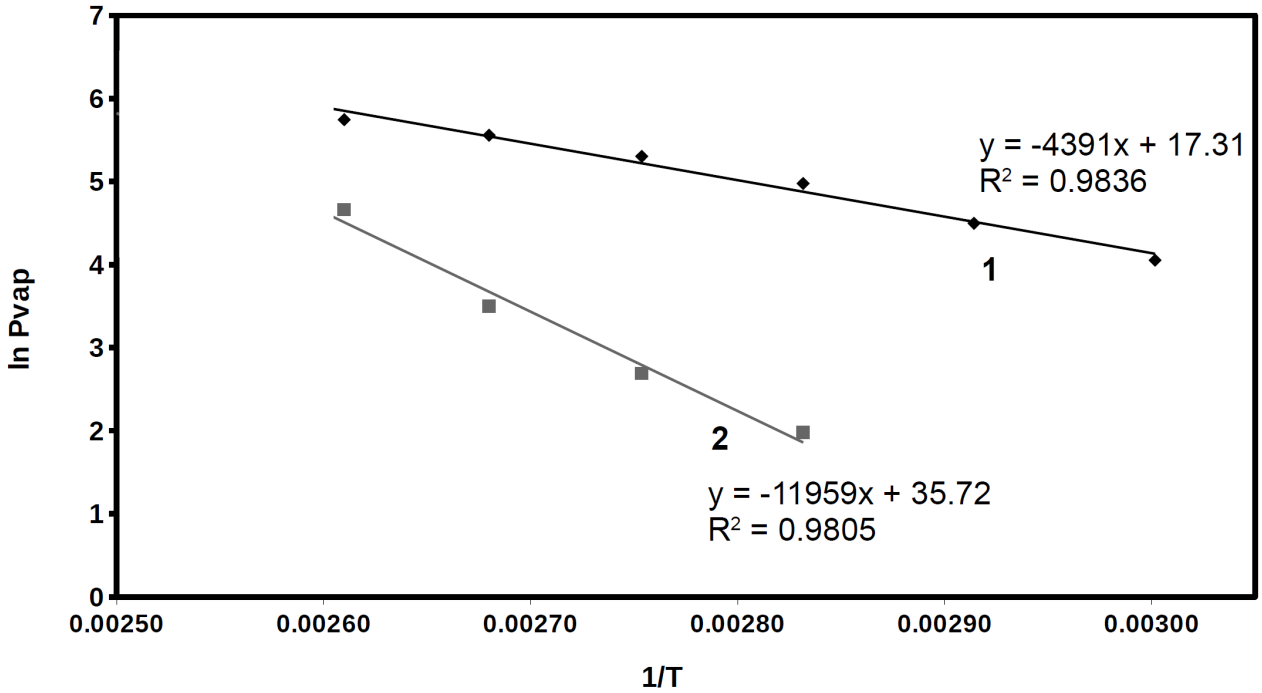

Figure S-2: Vapour pressure curves for compounds **1** and **2**. Stepped isothermal experiments were performed on both precursors, and temperature-dependent mass loss rates were used to determine vapour pressures as per the methods of *Kunte et al.*[49].

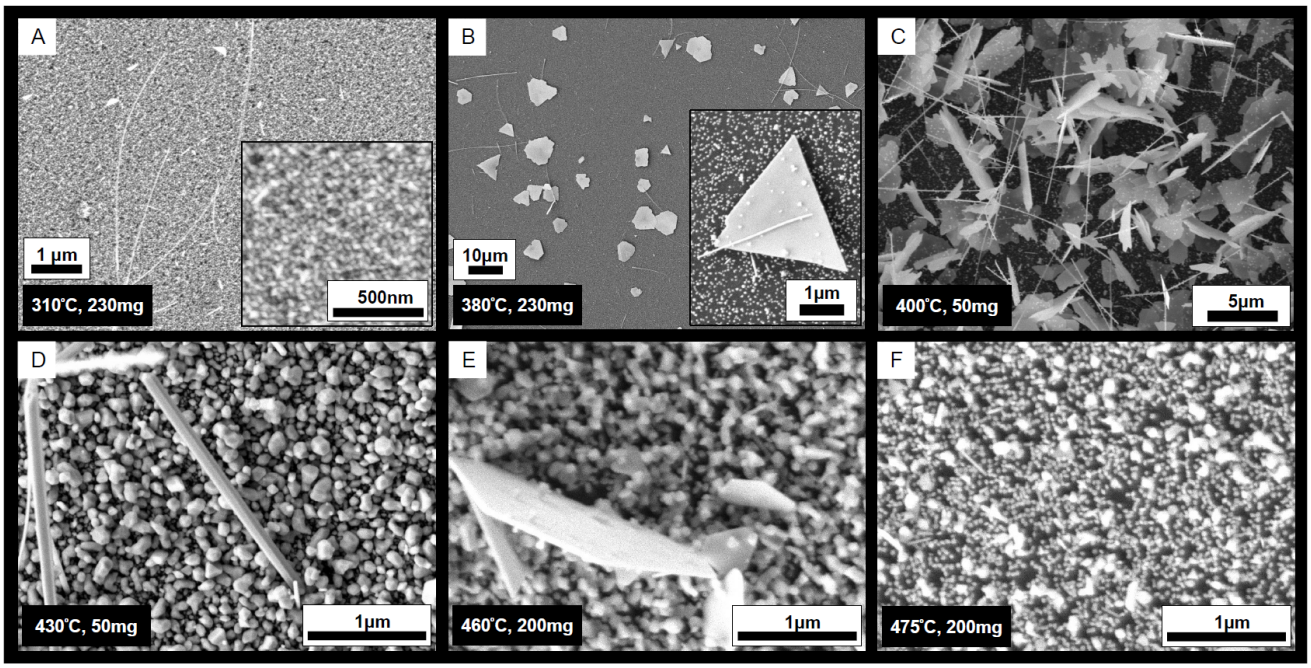

Figure S-3: SEM images of gold metal deposited from **1** by CVD shown in order of increasing (A-F) temperature. Nanoparticulate films (A) transition to plate depositions (B, C, E). Wires or rods (A-D) are observed at all temperatures. Nanoparticulate films dominate above 460°C (E, F). Plates and wires always grow over top of a nanoparticulate seed layer.

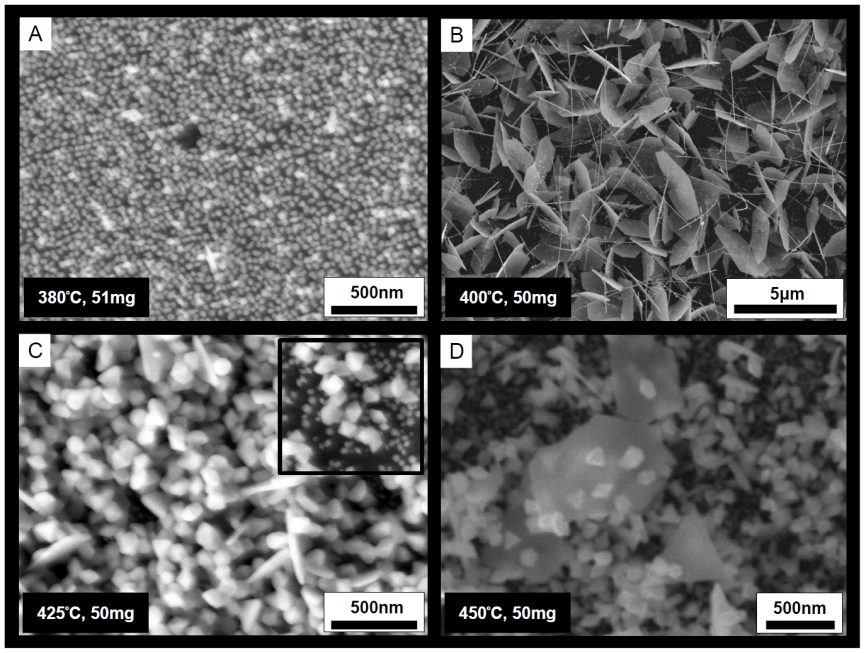

Figure S-4: SEM images of gold metal deposited from **2** by CVD shown in order of increasing (A-D) temperature. Small nanoparticles were observed at 380°C and below (A). Gold plates and nanowires grew simultaneously in high abundance at 400°C (B). The transition to large nanoparticle growth is obvious at 425°C (C), where 100nm and larger nanoparticles grow overtop of a small nanoparticle underlayer (C-inset). Plates and nanoparticles grow simultaneously until 460°C (D), above which temperature small nanoparticles are observed exclusively.

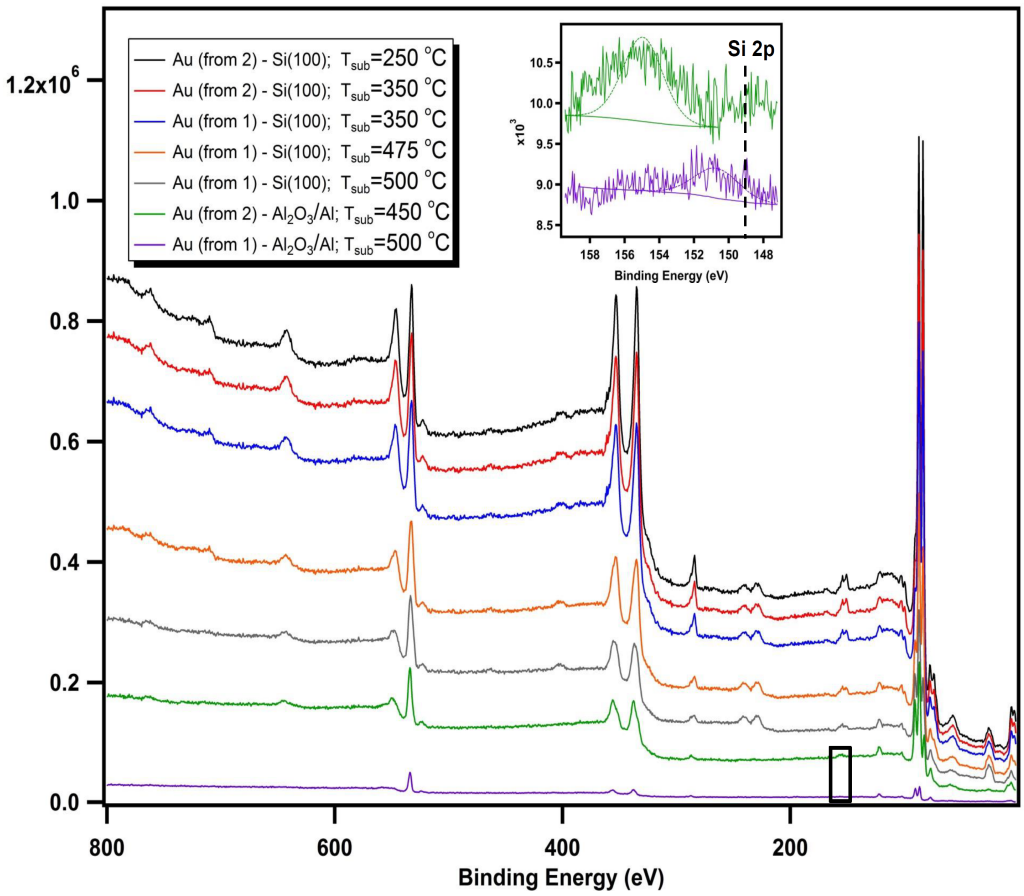

Figure S-5: XPS survey spectra of the as-deposited gold films on various substrates from either **1** or **2**. The inset plot contains the high-resolution scans of the Si 2p peak envelope (the relevant region in the survey scans is enclosed by the black box) corresponding to the as-deposited gold films from **1** and **2** on an Al_2O_3-coated (10 nm by ALD) Al substrates. The plots have been vertically stacked for clarity.