Electronic Supplementary Material (ESI) for RSC Advances.

Electronic Supplementary Information

An electrokinetic-combined electrochemical study of the glucose electro-oxidation reaction: effect of gold surface energy

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1. Physicochemical characterization of Au{111} and Au{200} surfaces

S1. X-ray Diffraction patterns.

The diffraction patterns showed in Fig. S1 have the typical face-centered cubic structure of gold materials. Both materials exhibited the (111), (200) and (220) crystallographic planes of Au located at 38.22, 44.5 and 59.76°, respectively. Peaks located at 42.35, 52.83 and 54.55 are characteristic of graphite which was used as substrate only for acquisition of XRD spectra.

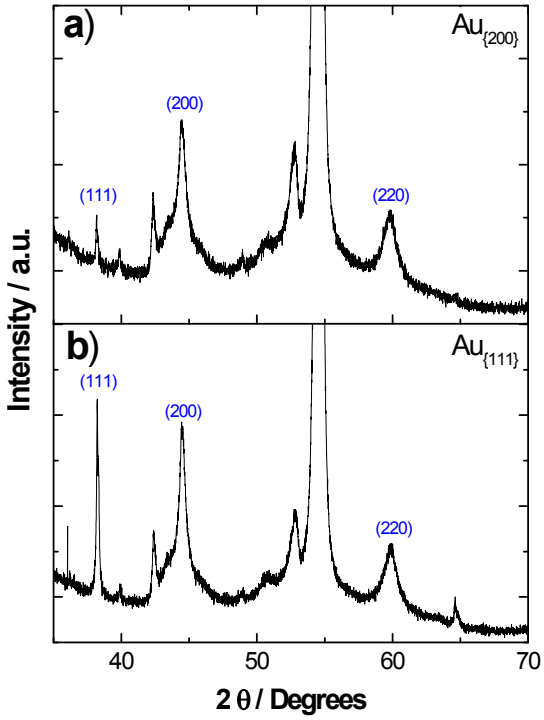

Figure S1. X-ray diffraction patterns of a) $Au_{\{200\}}$ and b) $Au_{\{111\}}$.

S2. AFM images of $Au_{\{111\}}$ and $Au_{\{200\}}$.

It can be observed from Fig. S2 that Au{111} showed a more uniform and homogeneous film compared with Au{200}. The approximated film thickness were calculated resulting in values of 380 and 550 nm for $Au_{\{111\}}$ and $Au_{\{200\}}$, respectively. Also, particle sizes of 380 and 610 nm were found.

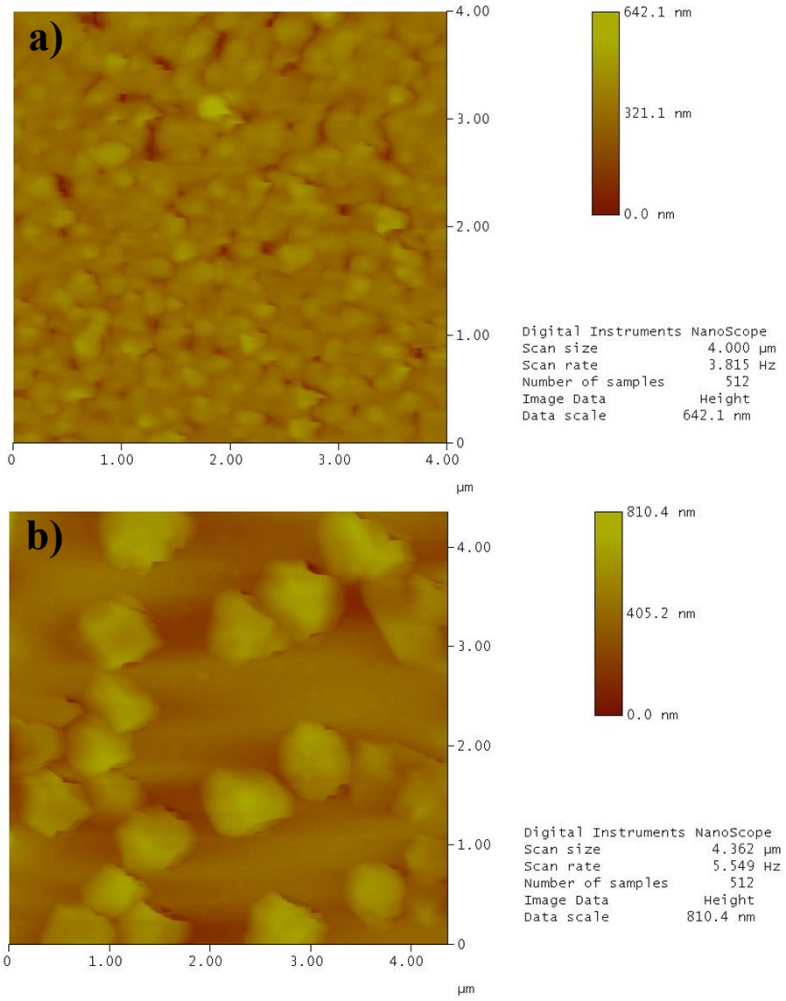

Figure S2. AFM images of a) $Au_{\{111\}}$ and b) $Au_{\{200\}}$.

2. Reproducibility and stability of gold surfaces

The reproducibility was tested on different syntheses. In Figure S1, the XRD patterns of both surface was obtained using graphite as substrate for clarity purposes due to the amorphous part of glassy carbon. However, when XRD was acquired on glassy carbon (Fig S3), the intensity rate between the (111) and (200) planes was kept for both surfaces, showing the reproducibility of these syntheses.

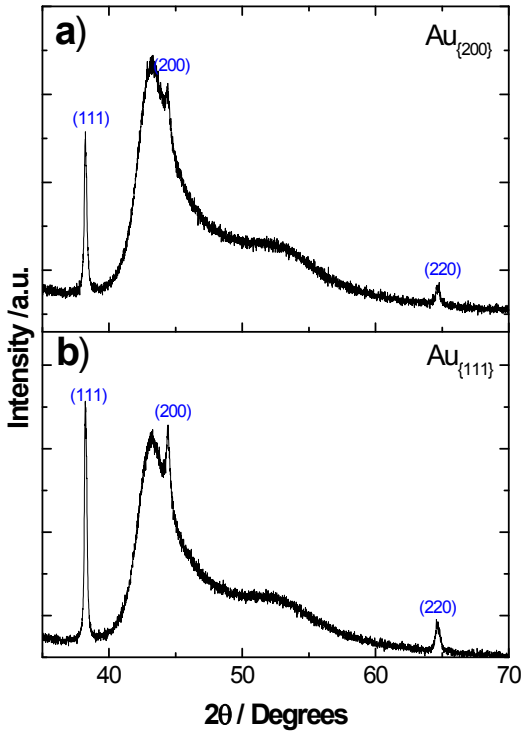

Figure S3. XRD patterns of a) $Au_{\{200\}}$ and b) $Au_{\{111\}}$ synthesized on glassy carbon electrodes.

The stability was evaluated through XRD data before and after each electrochemical measurements. For clarity purposes in Fig. S4, only the XRD patterns for $Au_{\{200\}}$ are shown. These specific patterns were obtained for Figure 5, after cycle 1 and cycle 10 for voltammograms in 0.5 M H_2SO_4 at 50 mV s^{-1} using nitrogen as inert atmosphere.

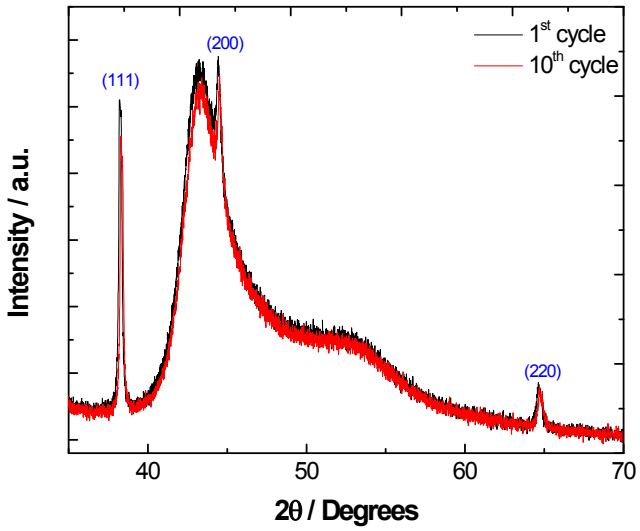

Figure S4. XRD patterns for $Au_{\{200\}}$ obtained after cycling in 0.5 M sulfuric acid.