Supplementary Information

Electrochemical growing of Au architectures on glassy carbon and their evaluation toward glucose oxidation reaction

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Au architectures reproducibility.

In order to prove the reproducibility of the electrochemical synthesis methods used in these work several experiments were done and are shown in the follow figures.

Figure S1 shows two diffraction patterns of system II (other systems exhibit the same behavior), can be observed no crystallographic and crystal size changes.

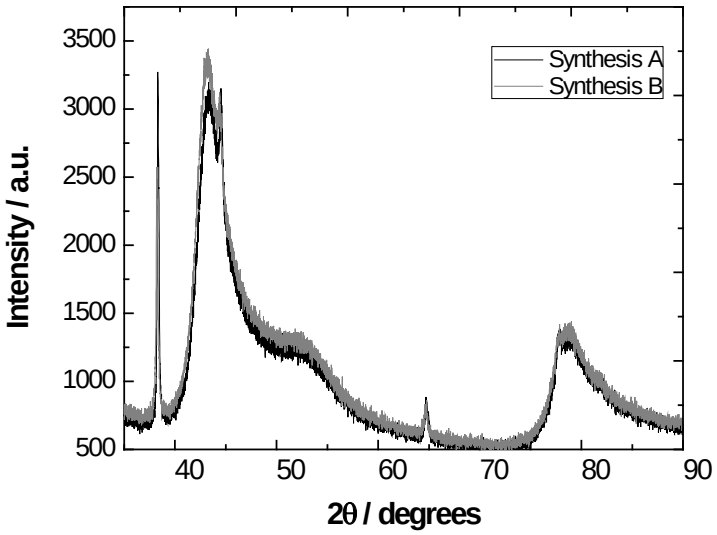

Figure S1. Diffraction patterns for different experiments using the synthesis conditions of the system II.

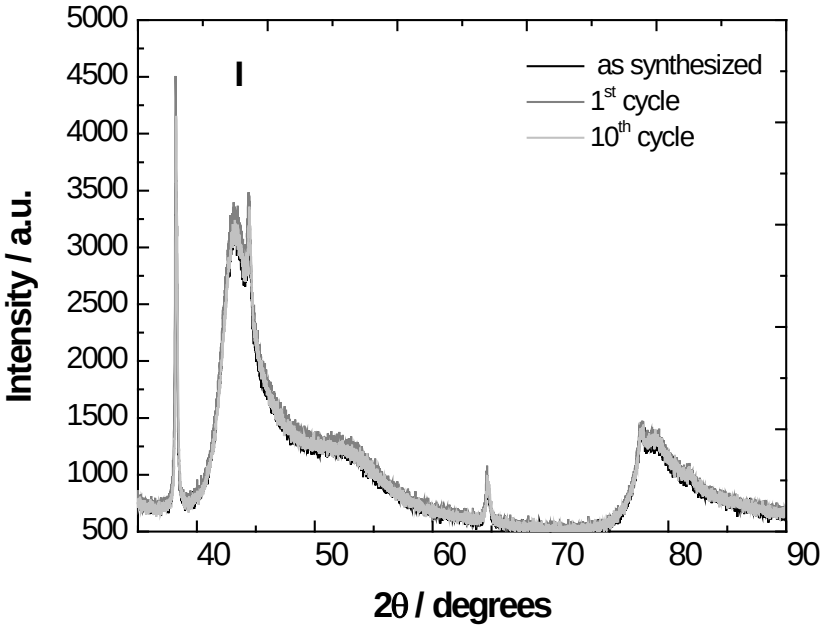

Figure S2 Diffraction pattern of the system I before (as synthesized) and after of its evaluation toward glucose electrooxidation reaction (first cycle and tenth cycle).

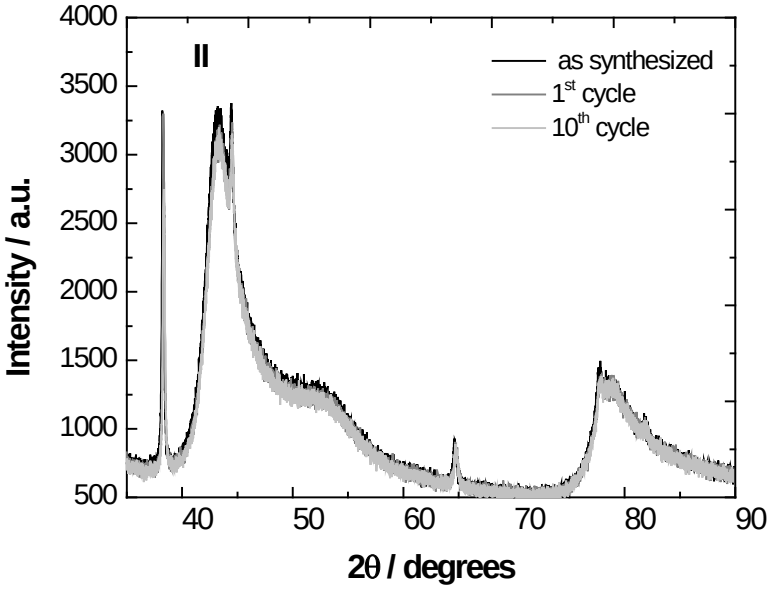

Figure S3 Diffraction pattern of the system II before (as synthesized) and after of its evaluation toward glucose electrooxidation reaction (first cycle and tenth cycle).

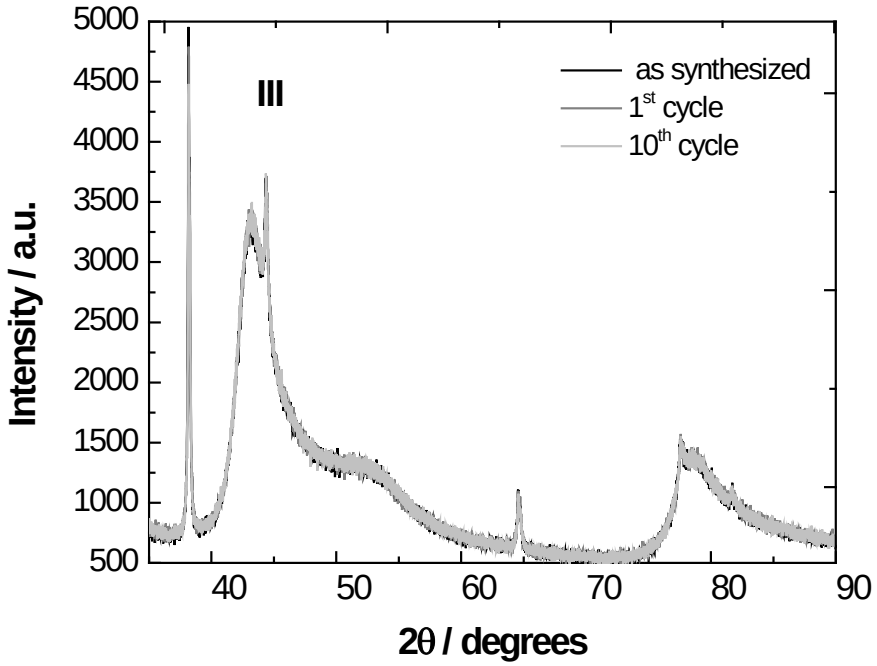

Figure S4 Diffraction pattern of the system III before (as synthesized) and after of its evaluation toward glucose electrooxidation reaction (first cycle and tenth cycle).

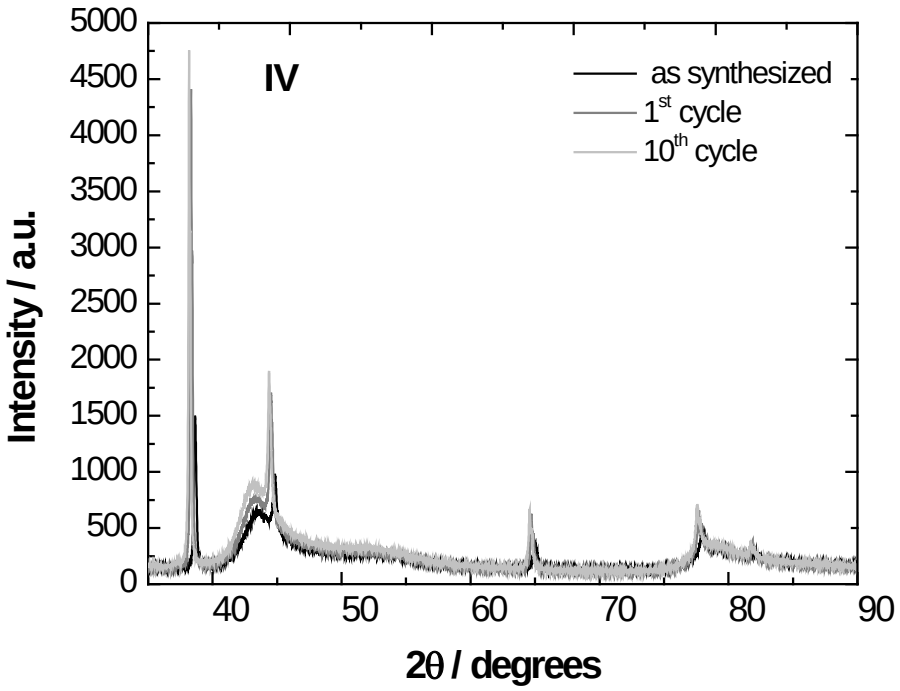

Figure S5 Diffraction pattern of the system IV before (as synthesized) and after of its evaluation toward glucose electrooxidation reaction (first cycle and tenth cycle).

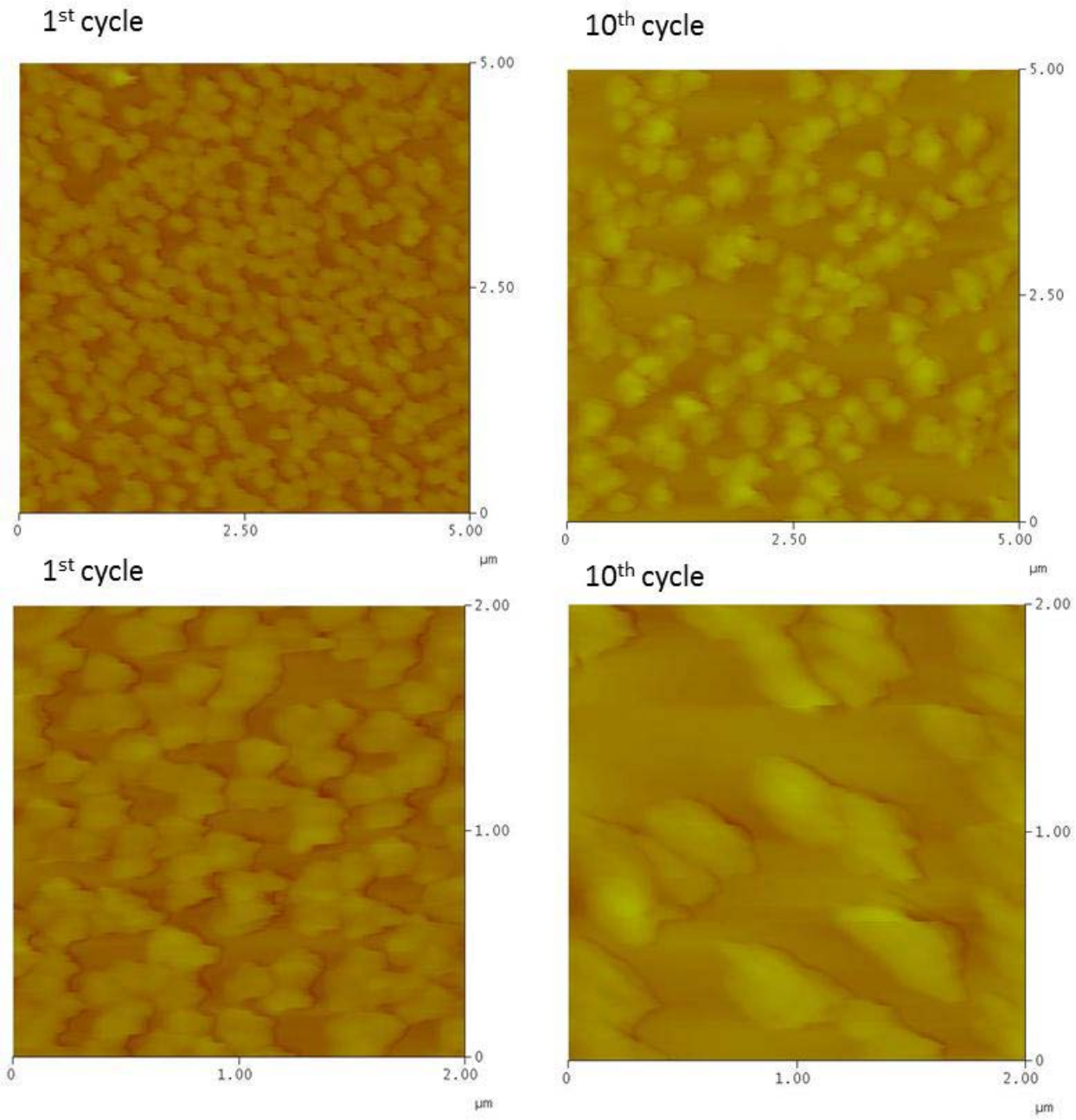

Figure S6. AFM images of the system I after the evaluation of the electrocatalytic activity of 100 mM glucose electrooxidation(1^{st} and 10^{th}cycle)

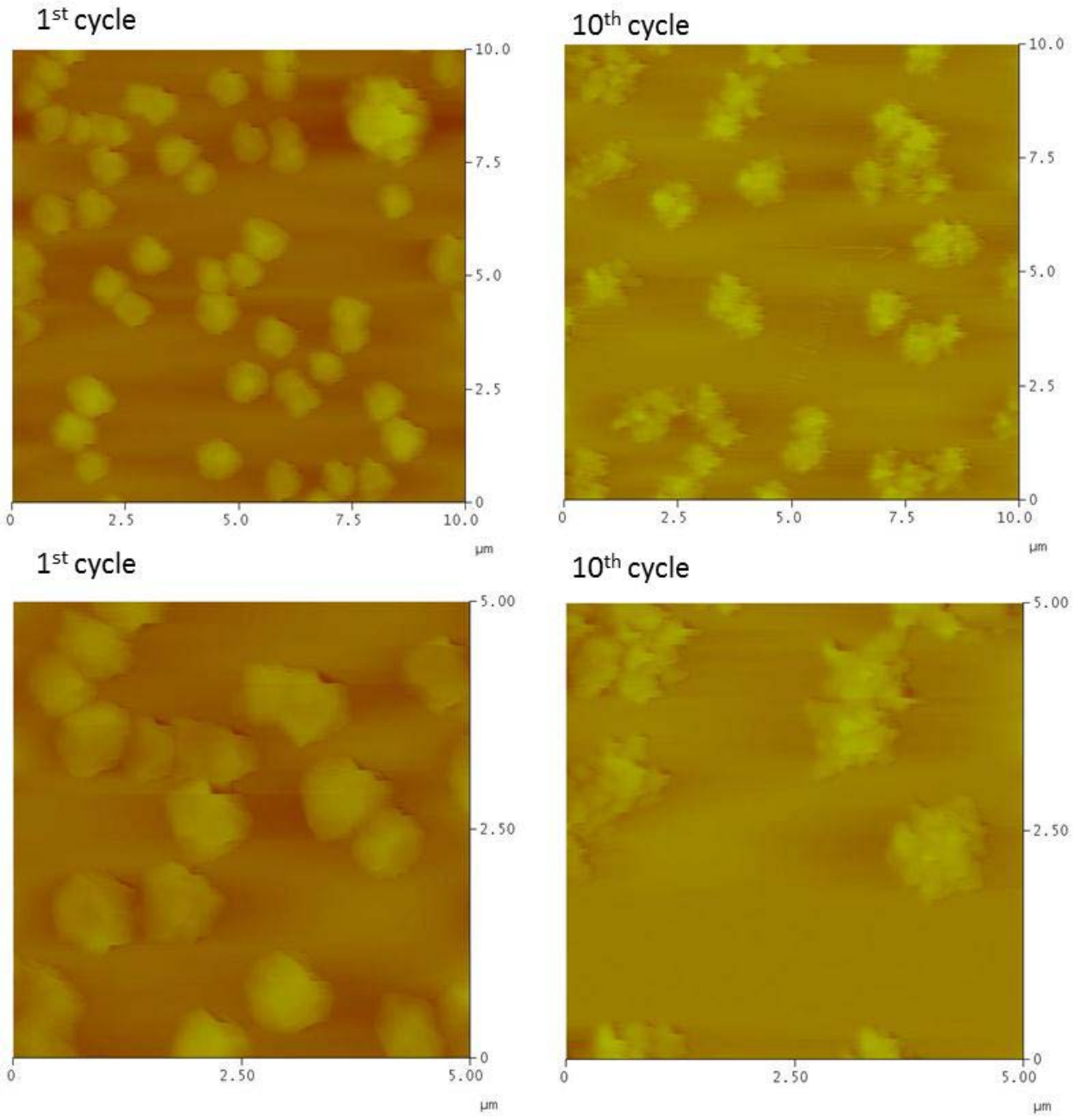

Figure S7. AFM images of the system II after the evaluation of the electrocatalytic activity of 100 mM glucose electrooxidation (1st and 10thcycle)

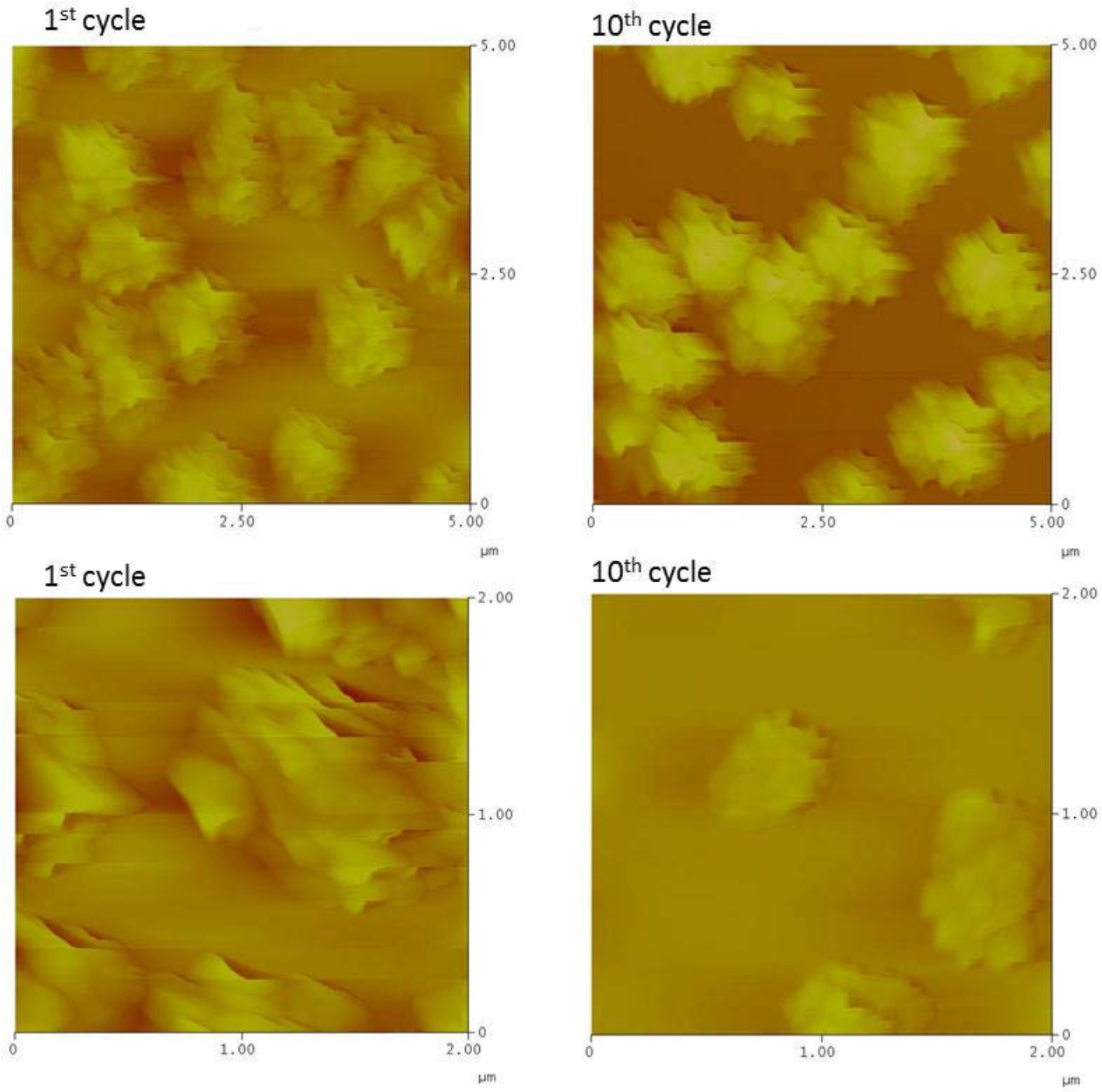

Figure S8. AFM images of the system III after the evaluation of the electrocatalytic activity of 100 mM glucose electrooxidation (1st and 10th cycle)

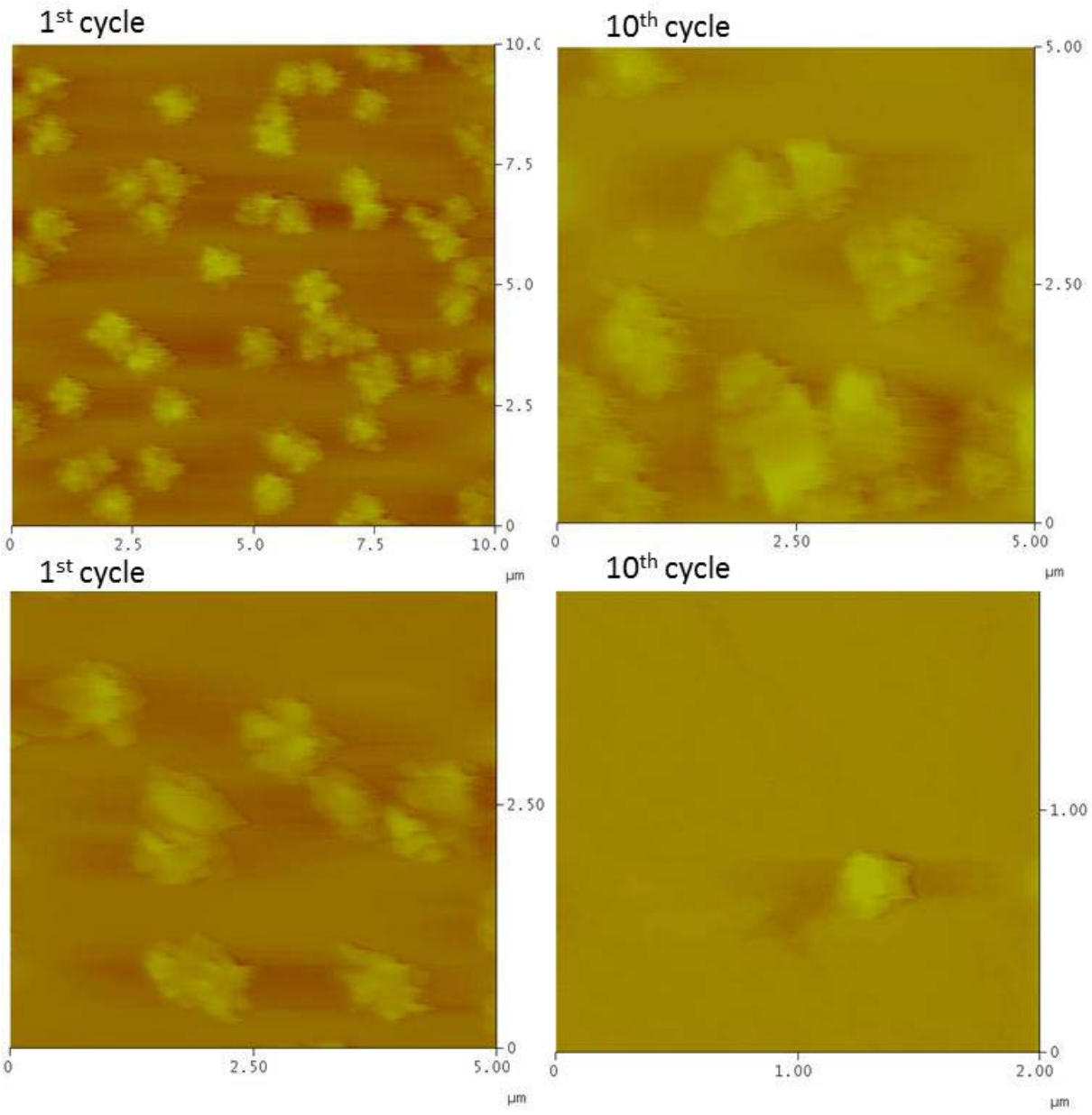

Figure S9. AFM images of the system IV after the evaluation of the electrocatalytic activity of 100 mM glucose electrooxidation (1st and 10th cycle)

Effect of the cycling on the Au surface

Possible changes on crystallographic characteristics and morphological structure of the Au films before and after of the electrocatalytic activity toward glucose electrooxidation reaction were analyzed by XRD measurements on glassy carbon plates (SPI® Instruments, 1.56 cm^2) and AFM images.

Figures S2 to S5 show the diffraction patterns of the system I to IV. For the systems I to III no significant changes on the crystallographic characteristics were observed, this behavior is related to the stability of the gold based materials for the glucose oxidation reaction. In the case of system IV an increment on diffraction peaks intensity was observed between 1^{st} cycle and 10^{th} cycle this could be related to the increment on the material crystallinity due to the atoms rearrangement by the effect of the electrochemical cycles. On the other hand a slight change on the 2 theta angle maximum peak was observed, this phenomenon could be attributed to the lattice parameter variation. At the same time, this behavior can be related with those obtained for the electrochemical response for glucose oxidation where changes in the oxidation potential between 1^{st} and 10^{th} cycle were observed (Figure 4-IV).

Figures S6 to S9 show the AFM images for the systems I to IV after the electrocatalytic activity evaluation. In the case of system I (figure S6) it is observed a change on the morphological structure, it is possible that the electrochemical cycles favors the rearrangement to more stable structures, however as is shown in the manuscript, no changes in the electrocatalytic activity are reveled. This result is according with the diffraction patterns, where no significant changes were observed. For the systems II to IV no significant changes on the morphology after the electrocatalytic evaluation was found.