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Reduction of molecular oxygen catalized by Fe and Co macrocyclic complexes confined on gold modified with self –assambled monolayers of thiols

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Self assembled monolayers (SAMs) of 4-aminothiophenol (4-ATF) functionalized with iron and cobalt phthalocyanines complexes adsorbed on gold(111) electrodes, have been constructed and characterized [1-3]. Their activity for the reduction of molecular oxygen has been examined. Electrochemical and scanning tunneling microscopy (STM) studies confirm the functionalization of the 4-ATF by iron and cobalt phthalocyanines complexes. STM images reveal that the metal-phthalocyanines complexes (MPc) are molecularly anchored to 4-aminotiofenol's organic monolayers, showing a surface orientation so-called "umbrella". The electrocatalytic studies carried out on the Au(111)-4-ATF-MPc electrode, showed that the O_2 reduction take place by the transfer of 4 electron when the metal complex is FePc, whereas a 2 electron transfer mechanism is observed when the metal complex is CoPc (see figure 1). The modified electrode constructed by simple adsorption of metal complex on the Au(111) surface showed the same electrocatalytic activity towards O_2 reduction.

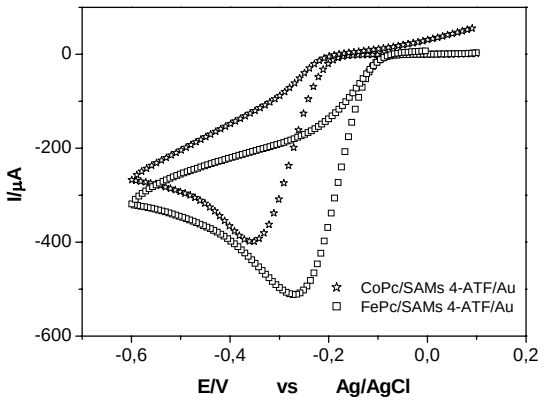

Figure 1: Voltametric answers for reduction of molecular oxygen. In NaOH 0.1M saturated with O_2, 0.05V/s.

References

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