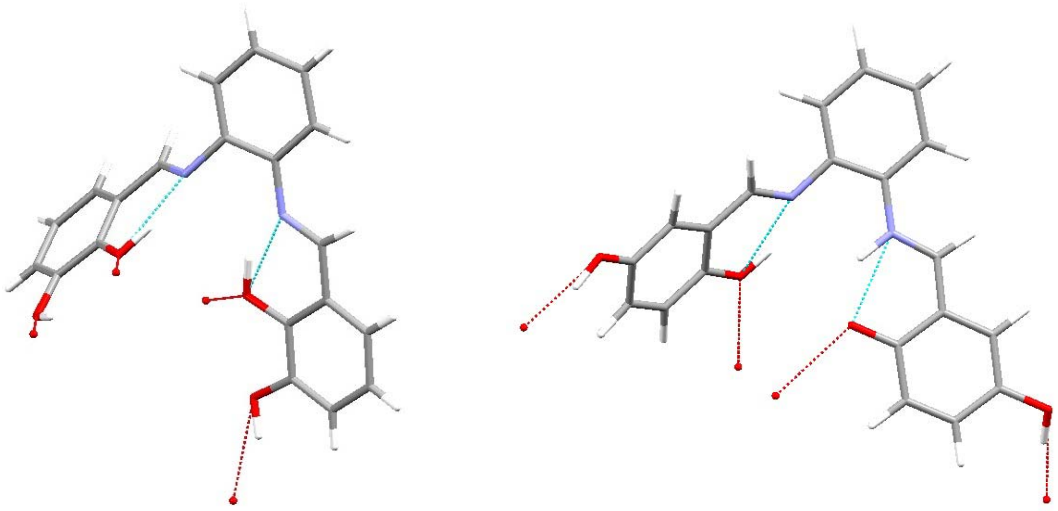
Supplementary information

Interactions of Schiff-Base Ligands with Gold Nanoparticles: Structural, Optical and Electrocatalytic Studies

Jose María Abad,*[a] Mónica Revenga-Parra, Tania García, Miriam Gamero, Encarnación Lorenzo and Félix Pariente



(A) **(B)**

Fig. S1 Crystallographic structures of the dihydroxysalophen isomers (A) 2,3-DHS; (B) 2,5-DHS obtained from the Cambridge Crystallographic Database (CDC) using MIJWUY, VEFTEG as entries, respectively. Blue and red sticks correspond to nitrogen and oxygen atoms, and dash lines indicate H-bonds. Mercury 2.3 and POV-Ray 3.6 software were used for visualization.

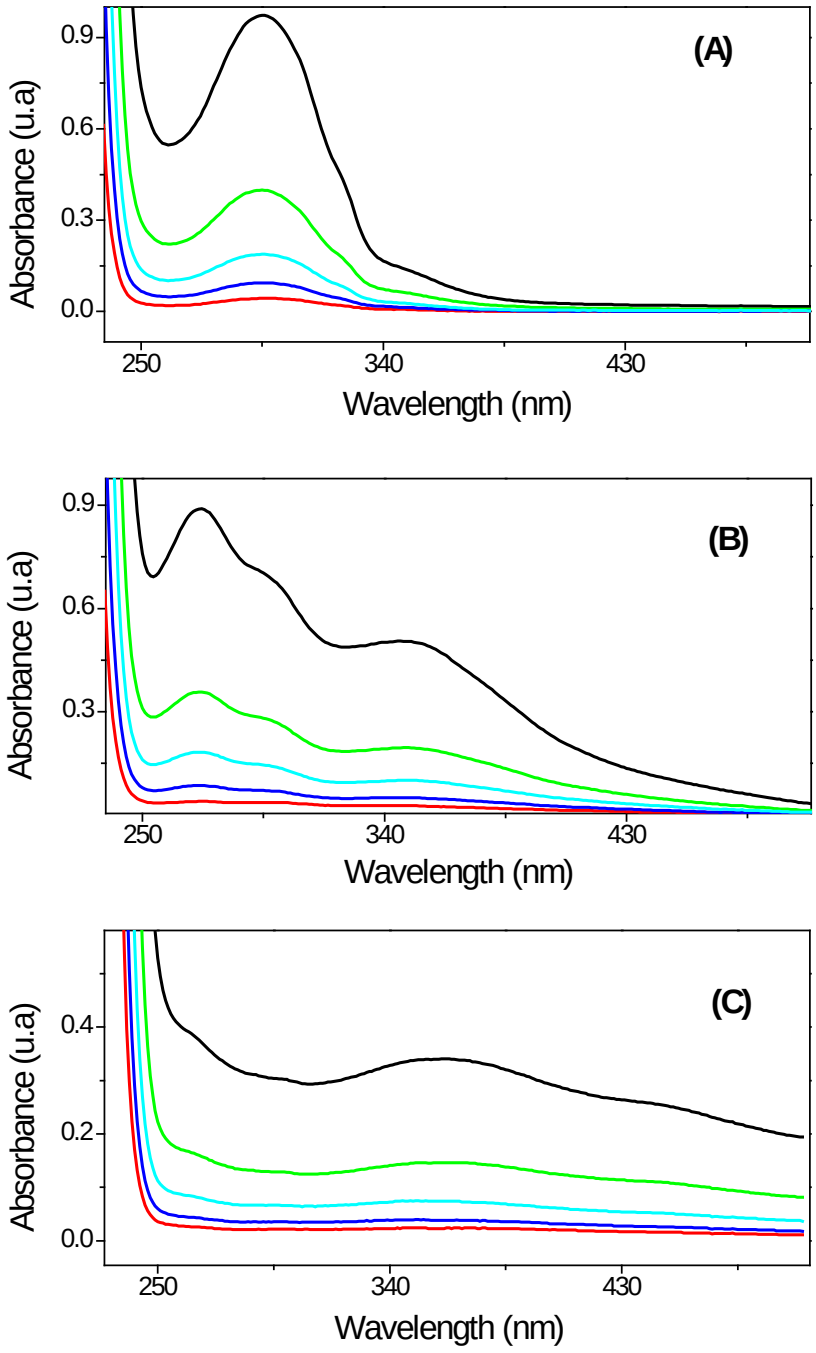


Fig. S2 UV-visible absorption spectra of the dihydroxysalophen isomers (A) 3,4-DHS; (B) 2,5-DHS; (C) 2,3-DHS in aqueous solution at different concentrations: 0.25 x 10^{-5} M (black line); 0.5 x 10^{-5} M (green line); 1 x 10^{-5} M (magenta line); 2 x 10^{-5}M (blue line) and 5 x 10^{-5} M (red line).

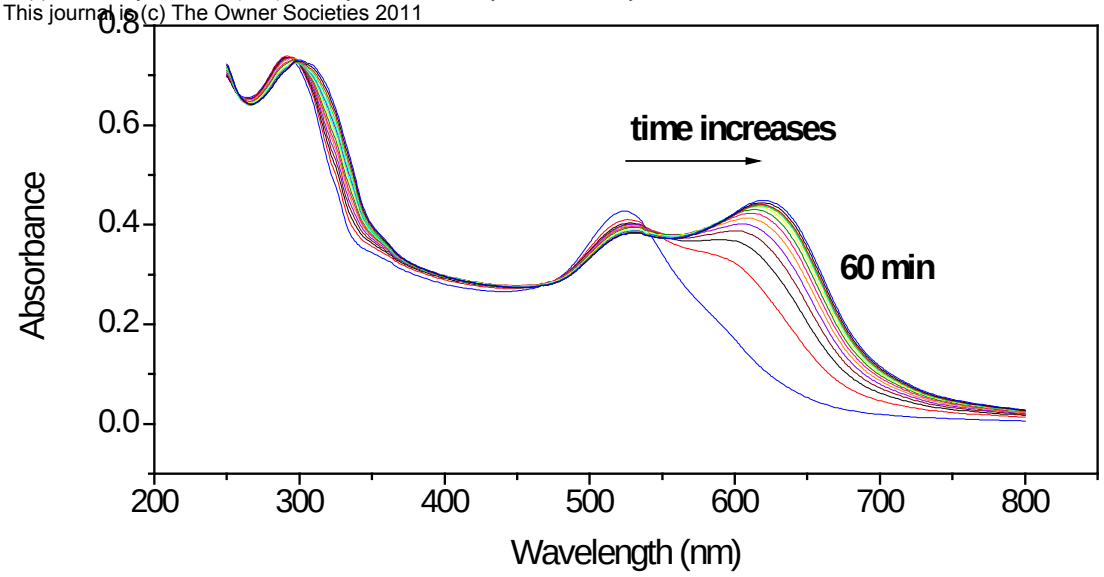


Fig. S3 Kinetic of the interaction between the 3,4-DHS ($2.0x10^{-5}$ M) and citrate-AuNPs ($1.8x10^{-9}$ M) at pH 7.4 at the presence of 5 mM of tris(hydroxymethyl)aminomethane. UV-visible absorption spectra were recorded every 5 min in aqueous solution.

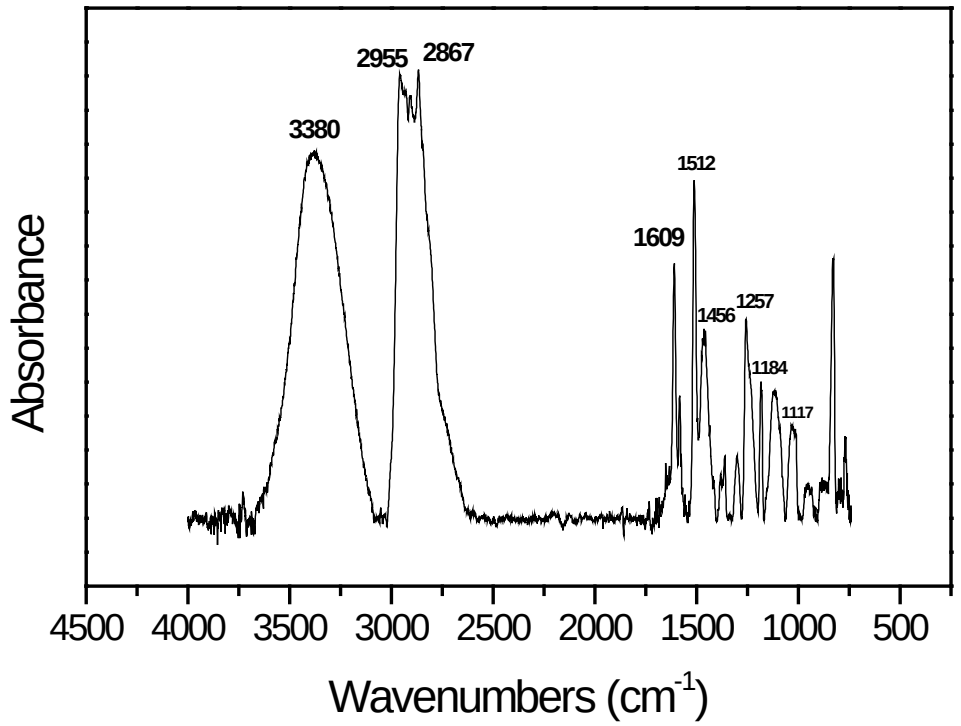


Fig. S4 Absorbance FTIR spectrum of citrate-Au nanoparticles at pH 9.3. Nanoparticles were drop-cast on a BaF_2 window and left to dry. Vibrations at 2955, 2867, 1609, 1512 and 1456 correspond to the vibrational modes $\nu_{asy}(-CH_2)$, $\nu_{sym}(-CH_2)$, $\nu_{asy}(-CO_2^-)$, $\nu_{sym}(-CH_2)$, $\nu_{sym}(-CO_2^-)$, respectively. The band at approximately 3380 cm^{-1} correspond to the ν(-OH) vibration and the bands at 1257 and 1184 cm^{-1} are correlated with ν(-CO).

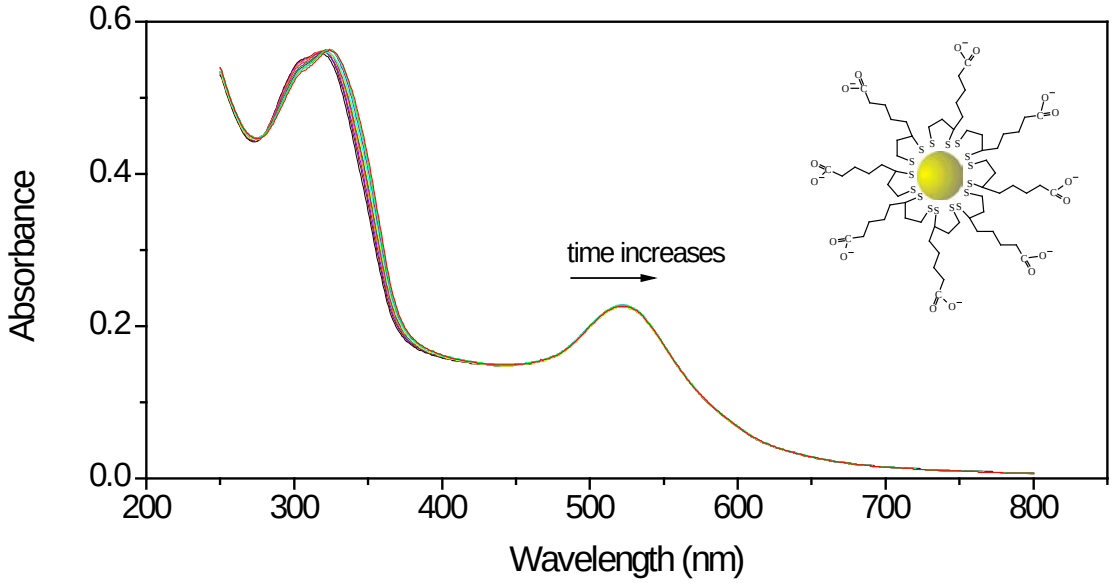


Fig. S5 Kinetic of the interaction between the 3,4-DHS ($2.0x10^{-5}$ M) and thioctic-AuNPs ($1.8x10^{-9}$ M) at pH 9.3 in aqueous solution. UV-visible absorption spectra were recorded every 5 min in aqueous solution.

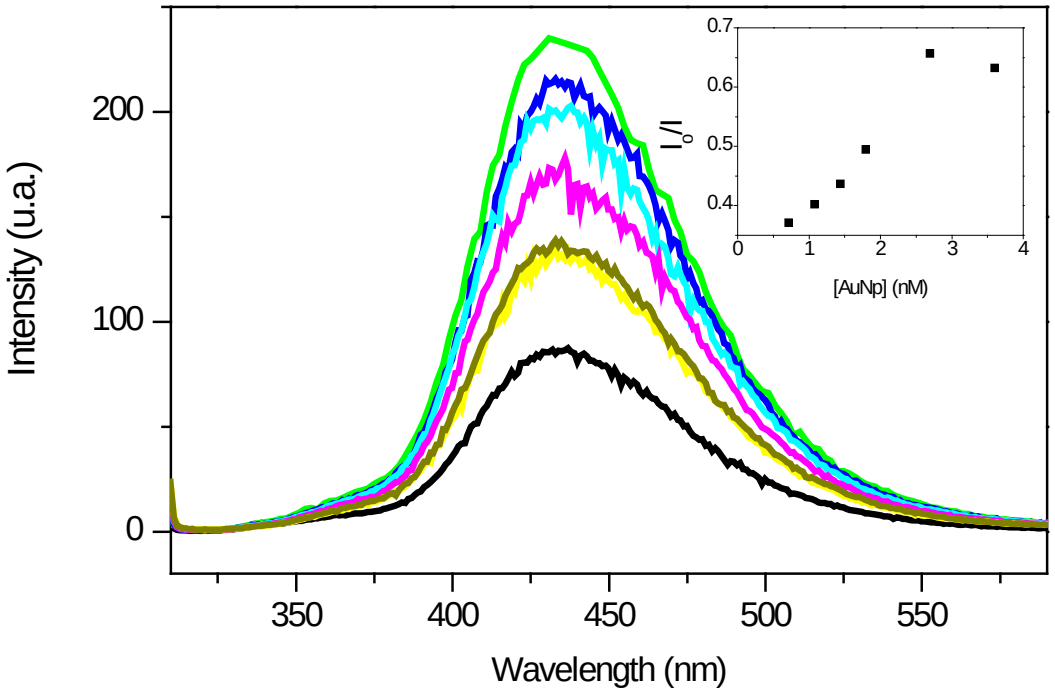


Fig. S6 Emission spectra of 2,3-DHS ($2.0x10^{-5}$ M) in aqueous solution containing different concentrations of AuNPs. Inset: Stern-Volmer plot of 3,4-DHS with the increasing concentrations of AuNPs. [AuNPs]: 0.0 M (black line); $7.2x10^{-10}$ M (green line); $1.1x10^{-9}$ M (blue line); $1.4x10^{-9}$ M (magenta line); $1.8x10^{-9}$ M (cyan line); 2.7 x 10^{-9}M (yellow line); 3.4 x 10^{-9}M (brown line).

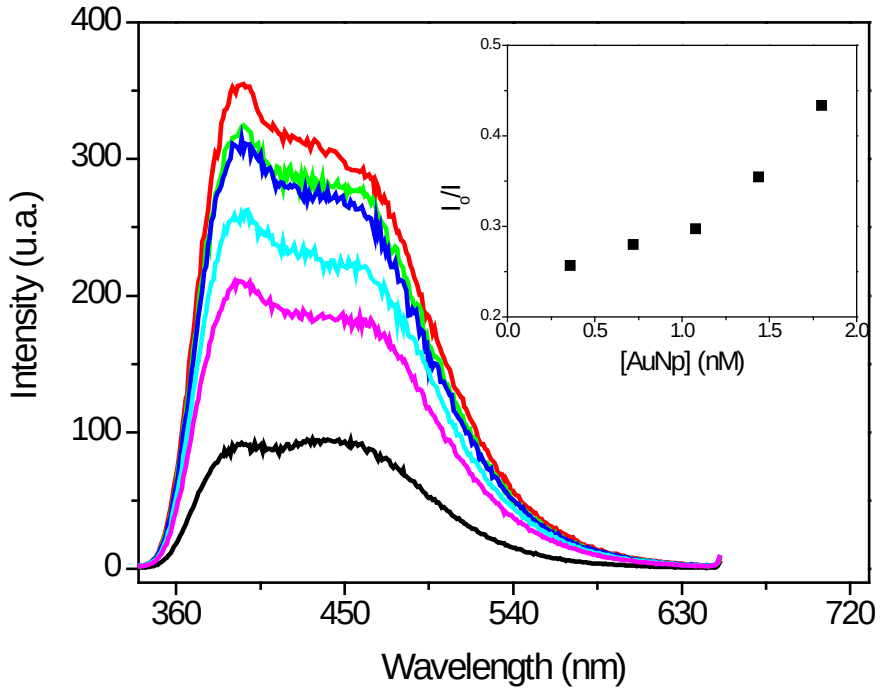


Fig. S7 Emission spectra of 2,5-DHS ($2.0x10^{-5}$ M) in aqueous solution containing different concentrations of AuNPs. Inset: Stern-Volmer plot of 2,5-DHS with the increasing concentrations of AuNPs. [AuNPs]: 0.0 M (black line); $7.2x10^{-10}$ M (green line); $1.1x10^{-9}$ M (blue line); $1.4x10^{-9}$ M (magenta line); $1.8x10^{-9}$ M (cyan line).

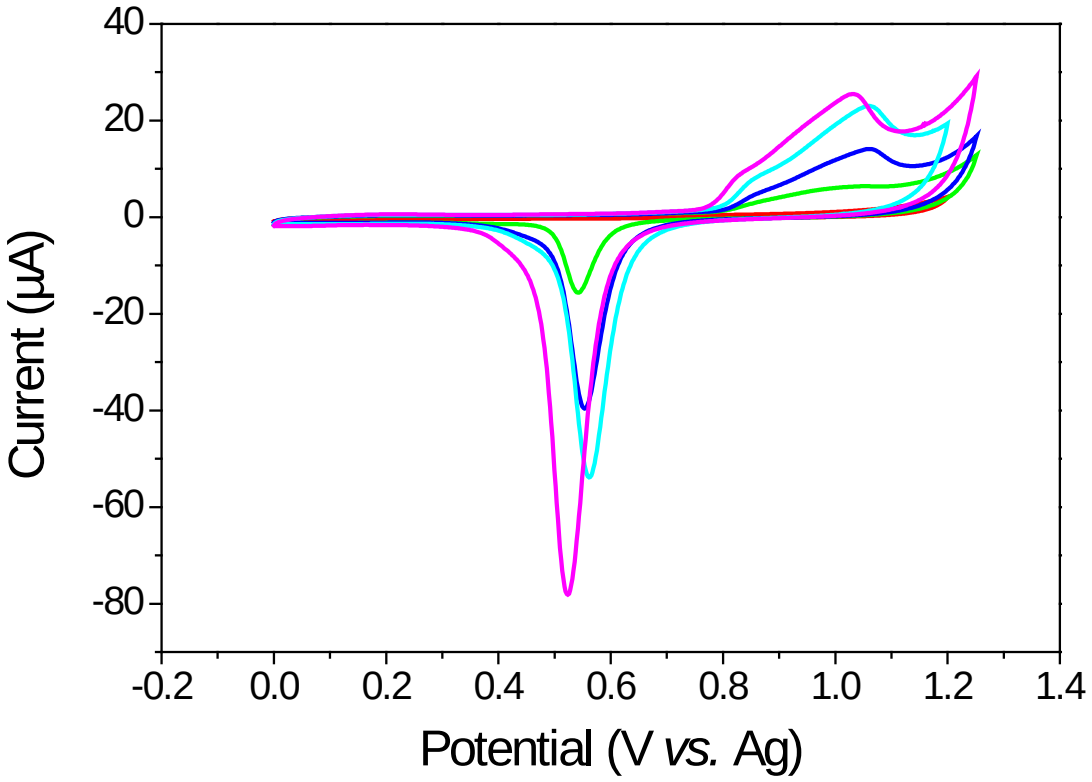


Fig. S8 Cyclic voltammograms of carbon-screen printed electrodes in 0.1 M H_2SO_4 before (red line) and after electrodeposition of citrate-AuNPs by application of a constant positive potential of +0.8 V during increasing periods of time: 15 min (green line); 30 min (blue line); 45 min (magenta line) and 60 min (cyan line). Measurements were carried out at a scan rate of 100 mV/s.

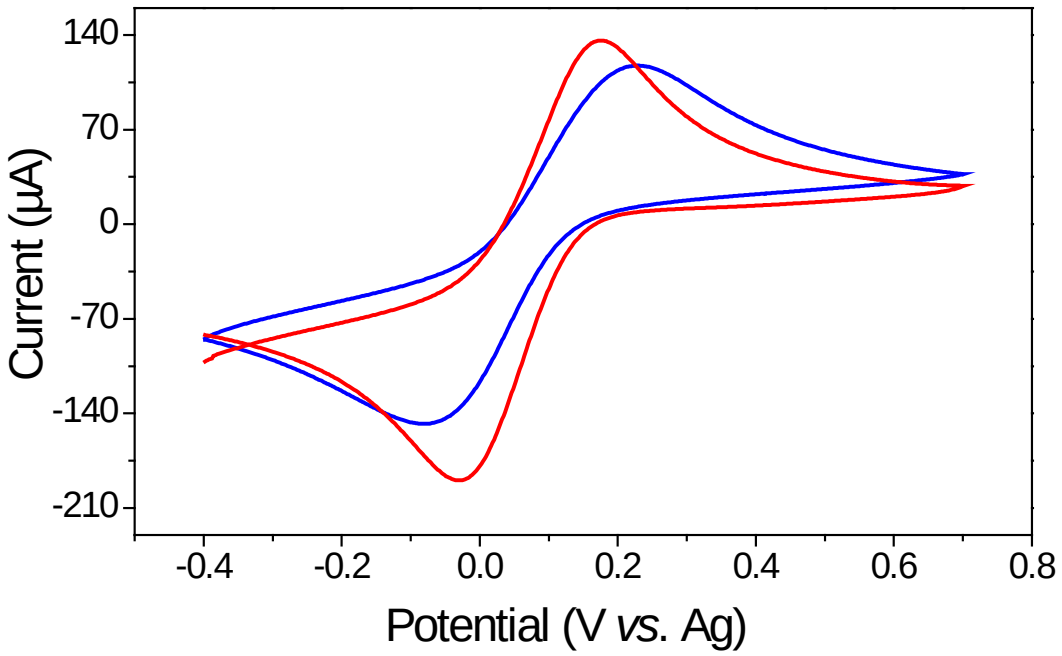


Fig. S9 Cyclic voltammograms of carbon-screen printed electrodes in phosphate buffer solution (pH 7.0) containing 10mM $[Fe(CN)_6]^{3-}$ before (blue line) and after electrodeposition of citrate-AuNPs (red line) by application of a constant positive potential of +0.8 V during 60 min. Measurements were carried out at a scan rate of 100 mV/s.