Effect of number of electrochemical cycles in polyaniline electrosynthesis on carbon felt

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Carbon materials and conducting polymers are known by application in electronic devices. Electrosynthesis start is critical, because it defines morphology and structure of polymeric layers. This work aims optimize initial steps of polyaniline (PAni) electrosynthesis on carbon felts, changing the number of voltammetric cycles in aniline 0,5 mol L^{-1} and 1 mol L^{-1} of H_2SO_4, in scanning from -0,50 up to 1,05 V x Ag/AgCl, at 25 mV s-1, using Pt counterelectrode. Using felt treated at 1300ºC and layer obtained with 3, 6 and 9 voltammetric cycles, the characterization of them was realized by by scanning electronic microscopy (SEM), X-ray diffraction (XRD), FT-IR Spectroscopy and electrochemical impedance spectroscopy (EIS). Furthermore, an expressive increasing of layer thickness was observed, but heterogeneously. With increasing of number of cycles, the growth was more homegeneous, but with lower observable changes on thickness. In all cases, PAni was formed as policrystaline material, with incresing of contribution of crystals counter number of cycles. By FT-IR, it was noticed that emeraldine formation occurred gradatively, from structures less oxidized: the PAni less cycled were closest that leucoemeraldine; PAni from 9 cycles were closest to emeraldine, but all of them with presence of band related to electrical conductivity linked to acid doping. EIS showed that felt presents typical behaviour of amorphous carbon, which suffered gradative changing with cycles, increasing capacitance and decreasing electrical resistivity. It was observed that prime coats of PAni, formed at three start cycles, allowed higher attraction of charges in solution to layer surface, that emphasized between 3rd and 6th cycle. This phenomenon can be related to intense PAni formation closest to emeraldine on surface of felt at three next cycles, allowing formation of more crystalline and uniform structure of it and indicating requirement of 9 cycles to obtaining more condutive PAni.