

Electrochemical corrosion of a glassy carbon electrode

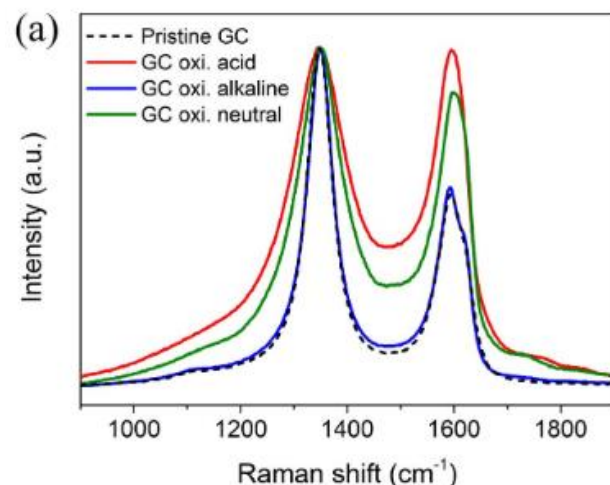


Figure 1. Raman spectrum of pristine GC, GC oxidized in acidic, neutral and alkaline media

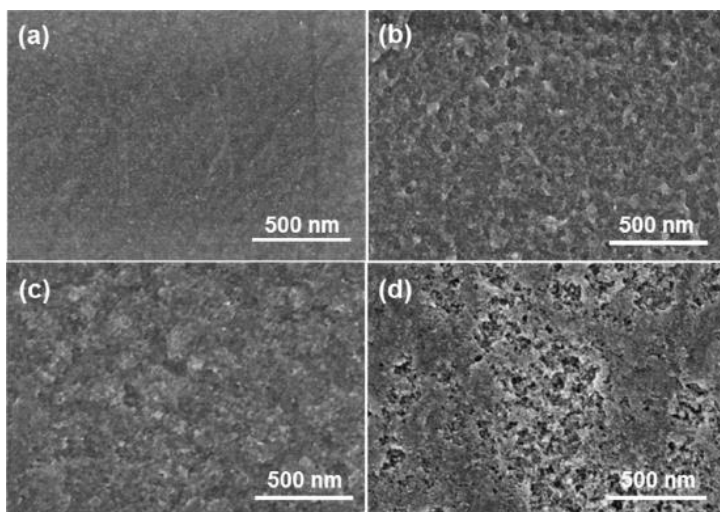


Figure 2. SEM images of pristine GC(a), GC oxidized in acidic(b), neutral (c) and alkaline(d) media at 1.5 kV with secondary electron

1. Objective of work

To determine the morphological and chemical changes that glassy carbon electrodes suffer by varying pH solution during the electrocatalysis such as oxygen evolution reaction.

2. Sample description

The electrodes were obtained by glassy carbon disks SIGRADUR G discs, 1 mm thinness and 10 mm diameter. The electrochemical experiments were performed using a three-electrode cell: GC electrode as working electrode, Pt wire as counter electrode, and SCE and mercury oxide as reference electrode. The solutions were: 0.5 M H₂SO₄, 0.5 M K₂SO₄ and 0.1 M KOH at 1.8 V by 24 h.

3. Equipment and conditions for Raman Spectroscopy

The Raman spectroscopy was performed on a Thermo Scientific DXR Raman Microscope, 50X magnification and 532 nm laser. GC electrodes were analyzed before and after of the electrochemical tests.

4. Results

The Raman spectrum presented in alkaline media is almost identical to the polished GC one, meaning that it wasn't presented a significant change; the changes were presented on low pH. The intensity of the G band (1580 cm⁻¹) increased by effect of molecular vibrations (amount of defects) instead of a higher degree of graphitization. The intensity at 1500 cm⁻¹ (between D and G bands) originates from amorphous carbon entities such as organic molecules, fragments and high density of functional groups. At low pH, the carbon electrodes oxidizes originating an increase of aforementioned entities. This information is consistent with the SEM images.
