# Methods used for Fit:

Least Square Fit:

(1)

*Fitting Data to Linear Models by Least-Squares Techniques*. <https://reference.wolfram.com/applications/eda/FittingDataToLinearModelsByLeast-SquaresTechniques.html> (accessed 2023-10-17).

# *Plots:*

## **Ni/Fe deposition:**

### 09/25 (pH 14,13) Catalyst 1

#### LSV



#### Voltegram Deposition at -1.5V



### 09/27 (pH 12.69, 13.69, 13.30, 14.30,13(comparing)) Catalyst 2

#### LSV



#### Voltegram Deposition at -1.5V



### LSV and CP at pH 13 to compare Catalysts 1 and 2



LSV around onset



LSV generally



CP at 0.5mA (7.14 mA/cm2) in pH 13 of both catalysts

|  |  |
| --- | --- |
| Catalyst 1 | Catalyst 2 |
| 0.642±0.001 | 0.709 ± 0.001 |

## **Oxygen Evolution Reaction (OER):**

### Just Carbon (pH14):

#### CV



#### CPs (0.5,1,2,3) x4



#### Tafel



R2 = 0.999

### pH 12.69 (0.05M)

#### LSV



#### CPs (0.5,1,2,3,4,5) x6



#### Tafel



R2=0.956

### pH 13 (0.1M)

#### LSV



#### CPs (0.5,1,2,3,4,5) x6



#### Tafel



R2 = 0.928

### pH 13.30 (0.2M)

#### LSV



#### CPs (0.5,1,2,3,4,5) x6



#### Tafel



R2=0.893

### pH 13.69 (0.5M)

#### LSV



#### CPs (0.5,1,2,3,4,5) x6



#### Tafel



R2 = 0.939

### pH 14 (1M)

#### LSV



#### CPs (0.5,1,2,3,4,5) x6



#### Tafel



R2 =0.953

### pH 14.30 (2M)

#### LSV



#### CPs (0.5,1,2,3,4,5) x6



#### Tafel



R2=0.935

## Table of pH, Slopes, and Onset Potential



Left: CV of Glassy Carbon OER; Right: LSV of Ni-Fe Alloy OER

Compared to Ni-Fe alloy Glassy Carbon at pH 14 have lower OER activity in the range of potentials and currents applied.

Area of Carbon Glassy Electrode = 0.07 cm2

Potential Ag/AgCl Reference Electrode against Standard Hydrogen Electrode Eo = +0.197 V

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Concentration (mol L-1) | pH | Tafel slope (V/dec) | Tafel slope err | Onset potential (V) | Onset err | R2 |
| 0.05 | 12.69 | 0.356 | 0.002 | 1.5 | 0.003 | 0.956 |
| 0.1 | 13 | 0.339 | 0.004 | 1.37 | 0.007 | 0.916 |
| 0.2 | 13.3 | 0.271 | 0.003 | 1.23 | 0.006 | 0.893 |
| 0.5 | 13.69 | 0.172 | 0.001 | 0.992 | 0.003 | 0.939 |
| 1 | 14 | 0.179 | 0.001 | 0.963 | 0.002 | 0.953 |
| 2 | 14.3 | 0.18 | 0.002 | 0.964 | 0.004 | 0.935 |



R2= 0.756