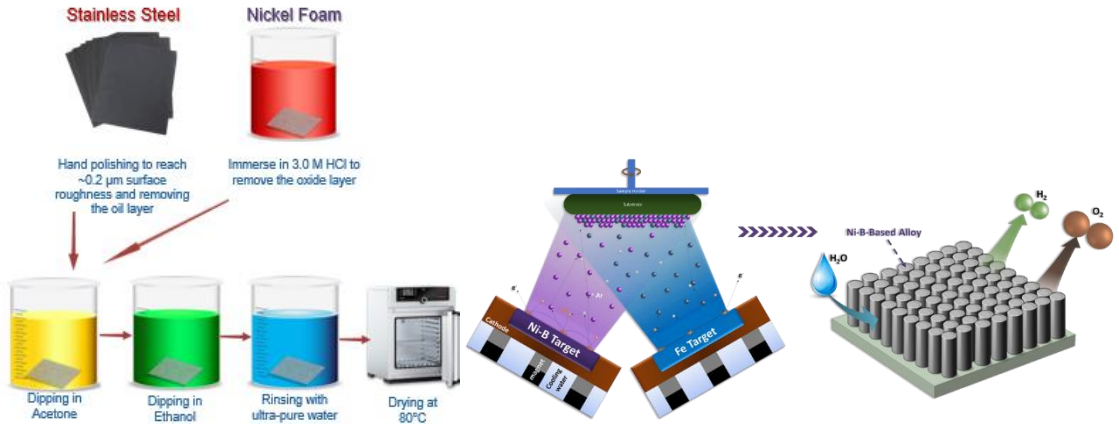
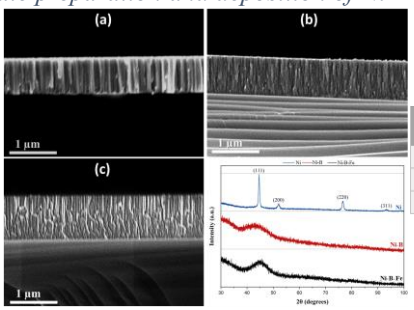


Figure 1 The substrate preparation and deposition of Ni-B-based electrocatalyst coatings with MSPVD



Electrocatalyst Coating	Ni (wt.%)	B (wt.%)	Fe (wt.%)
Ni	100.0	-	-
Ni-B	94.7	5.3	-
Ni-B-Fe	75.6	4.9	19.5

Figure 2 SEM images, XRD analysis and elemental analysis of electrocatalyst coatings deposited by MSPVD. Images belong to (a) Ni, (b) Ni-B, (c) Ni-B-Fe coatings on Si wafer substrate.

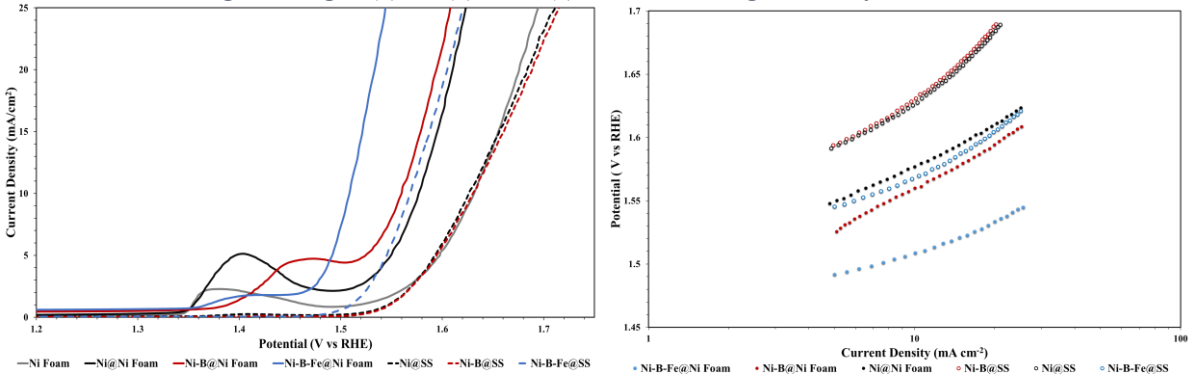


Figure 3 (a)Linear sweep voltammetry (LSV) at the scan rate of 2 mVs^{-1} in KOH (1.0 M) solution on MSPVD coatings (b)Tafel plots obtained from LSV curves.

- Ni-B and Ni-B-Fe coatings were successfully deposited by MSPVD.
- SEM and XRD analysis showed the presence of columnar morphology in all coatings and changing the crystal structure from crystalline in Ni coatings to amorphous in alloy coatings.
- ICP analyses showed that the chemical composition of the Ni-B-Fe coatings is $Ni_{3.69}$-$B_{1.30}$-Fe.
- Electrochemical analyses showed that Ni-B-Fe has the highest efficiency in terms of overpotential and Tafel slope. That can be attributed to the oxidation states of Fe which can be up to +6.
- Also, electrochemical analyses showed that the presence of B improved the efficiency of electrocatalyst coating when it was a porous substrate.
- It was observed that Ni-B-Fe coatings on Ni foam performed better than many other electrocatalyst coatings in the literature.