

Synergistic Effects of W-Doping in NiSSe for Enhanced Hydrogen Evolution Reaction (HER)

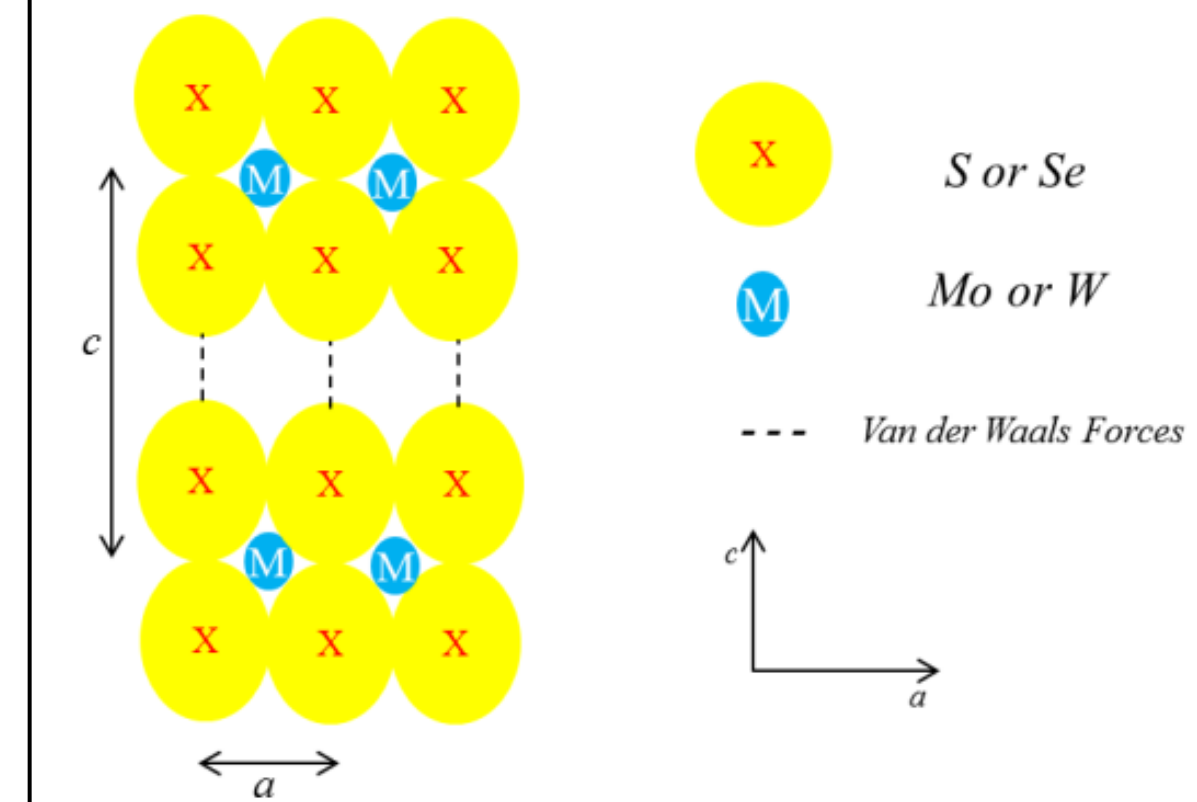
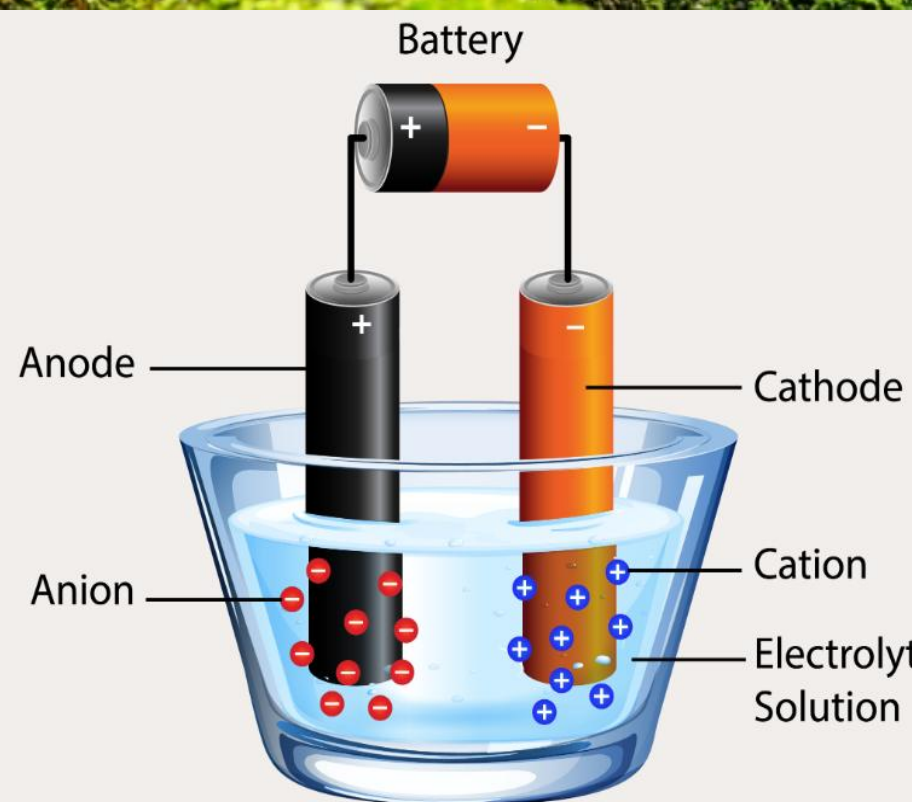
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INTRODUCTION & AIM

Sustainable Development Goals



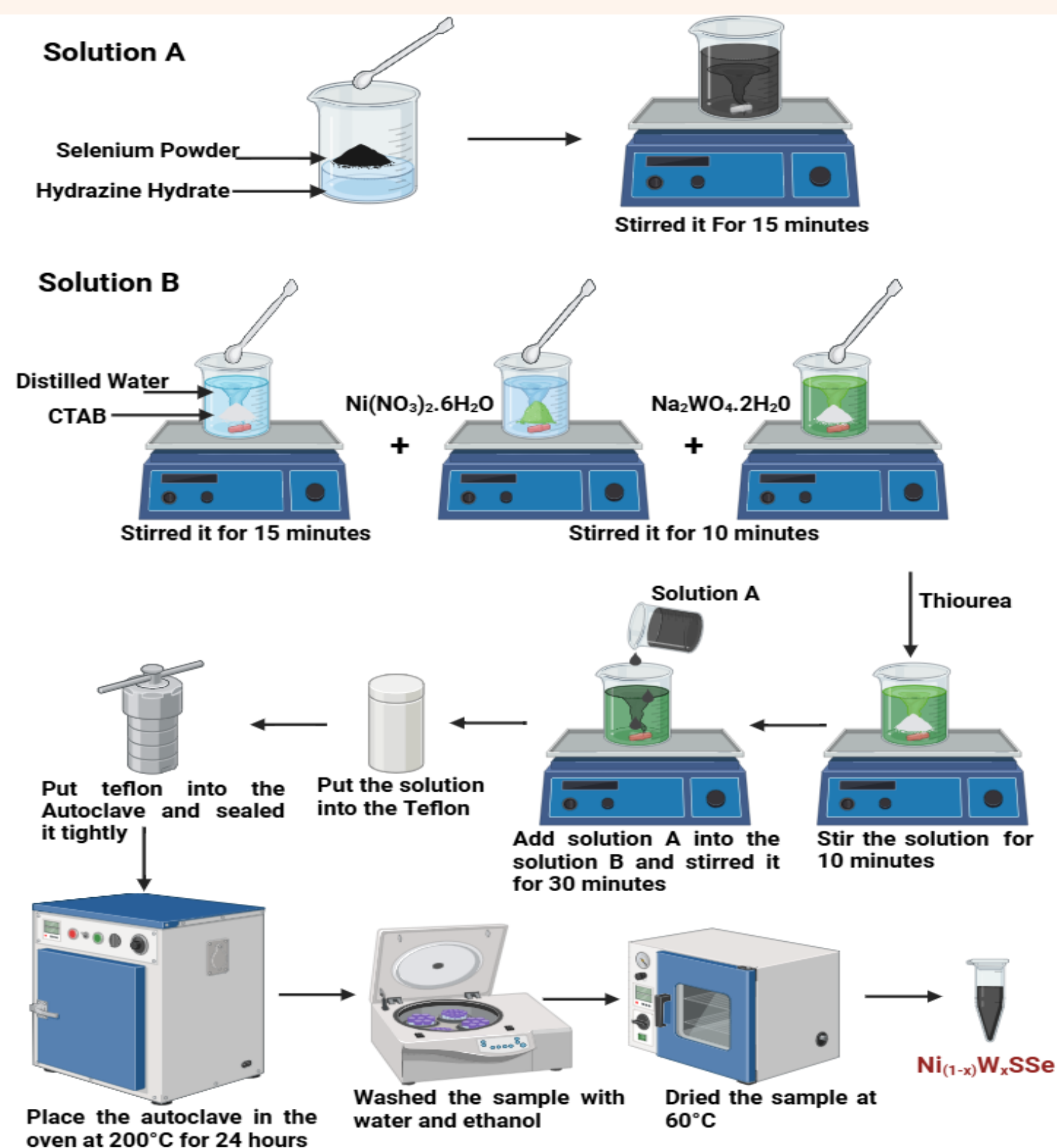
AIM: Synthesis and characterization of NiWSSe by the Hydrothermal method for Hydrogen Evolution Reaction (HER)

METHOD

Transition metal dichalcogenide-based electrocatalysts

❖ Prepared Samples:

- I. NiSSe
- II. Ni_{0.25}W_{0.75}SSe
- III. Ni_{0.5}W_{0.5}SSe
- IV. Ni_{0.75}W_{0.25}SSe



RESULTS & DISCUSSION

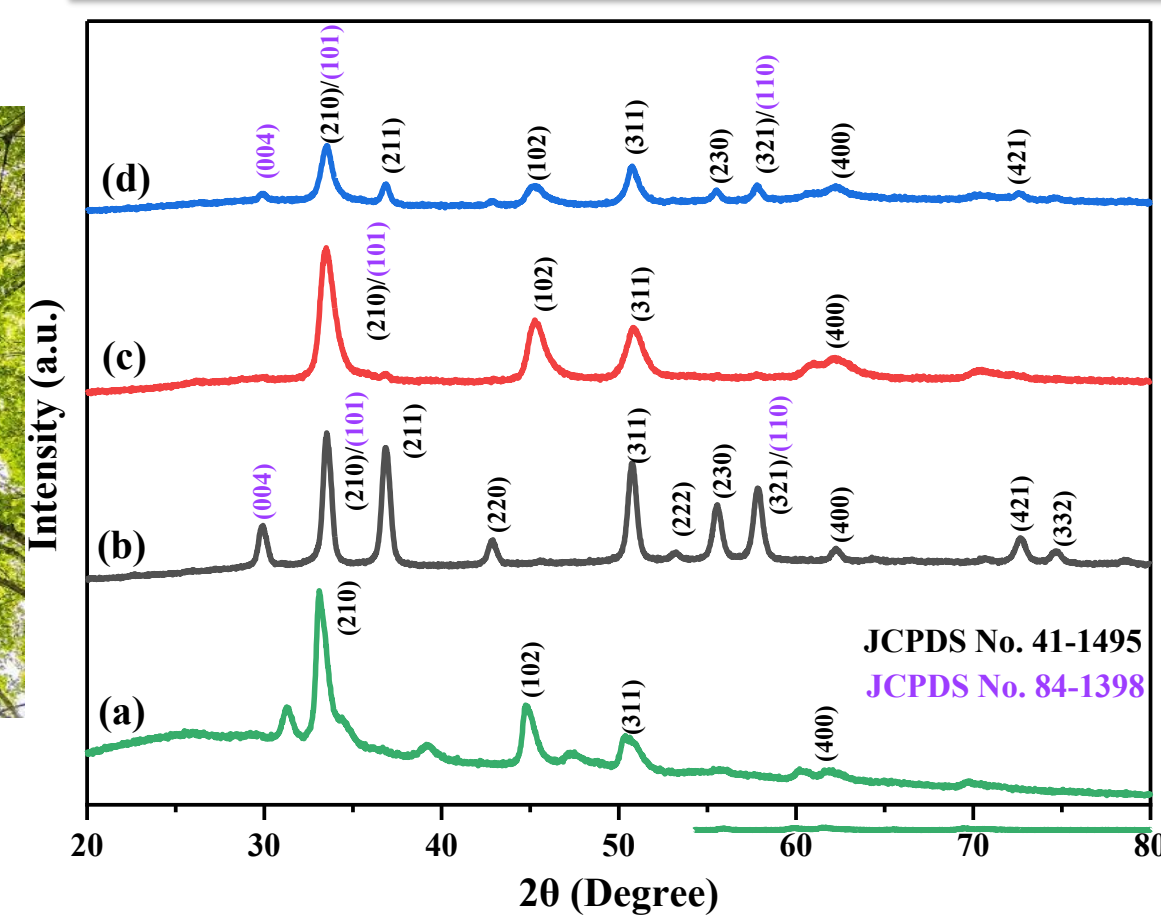


Figure 1. X-ray diffraction patterns of (a) NiSSe, (b) Ni_{0.25}W_{0.75}SSe, (c) Ni_{0.75}W_{0.25}SSe, and (d) Ni_{0.5}W_{0.5}SSe.

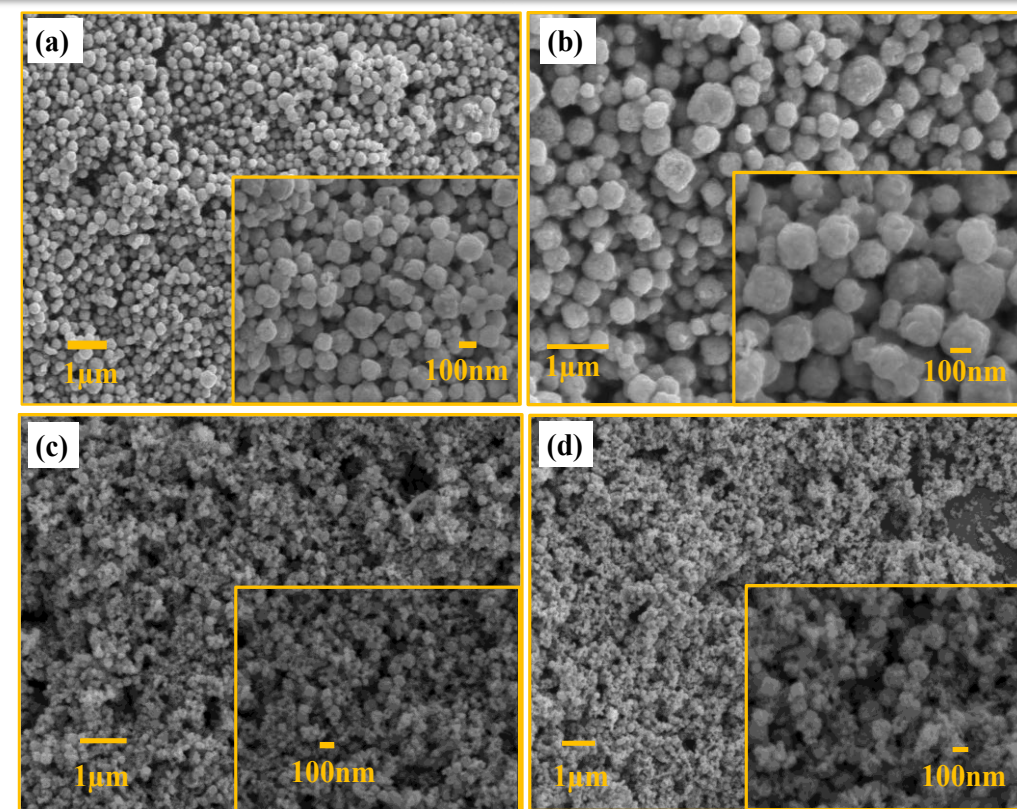


Figure 2. FE-SEM image of (a) and (b) Ni_{0.25}W_{0.75}SSe, and (c) and (d) of NiSSe

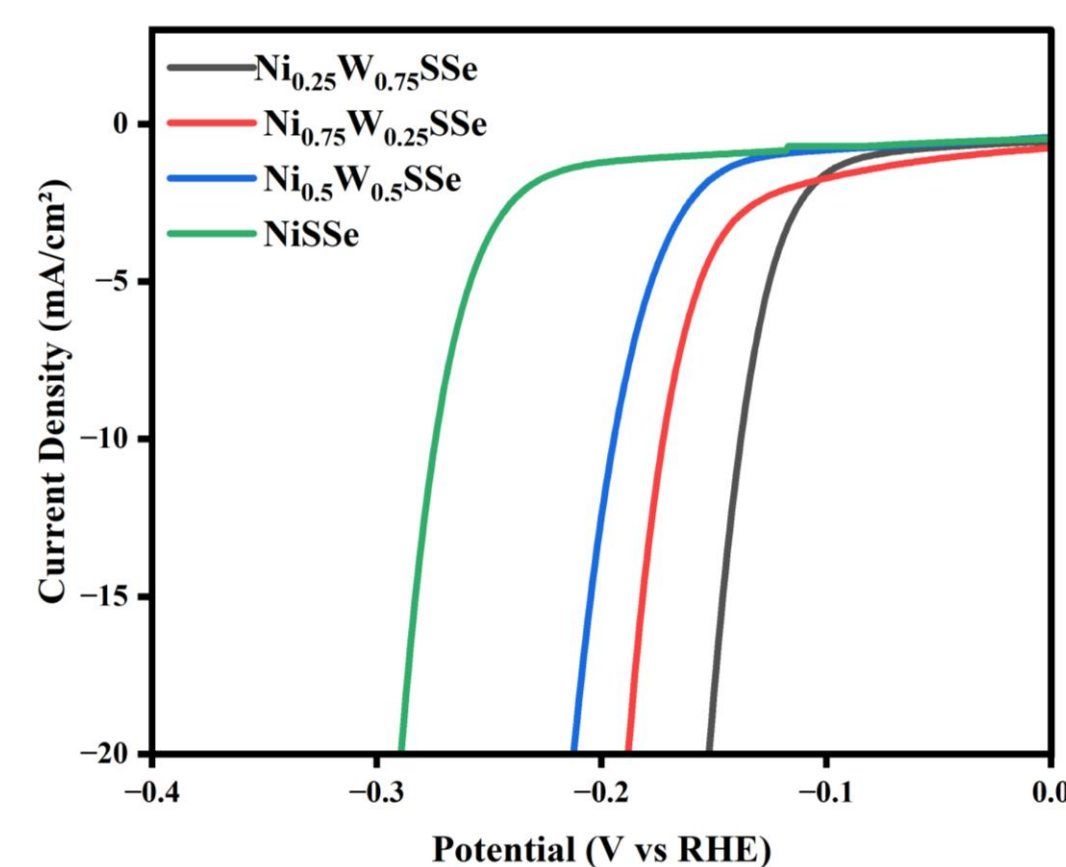


Figure 3. Linear sweep voltammetry graphs of (a) NiSSe, Ni_{0.25}W_{0.75}SSe, Ni_{0.75}W_{0.25}SSe, and Ni_{0.5}W_{0.5}SSe

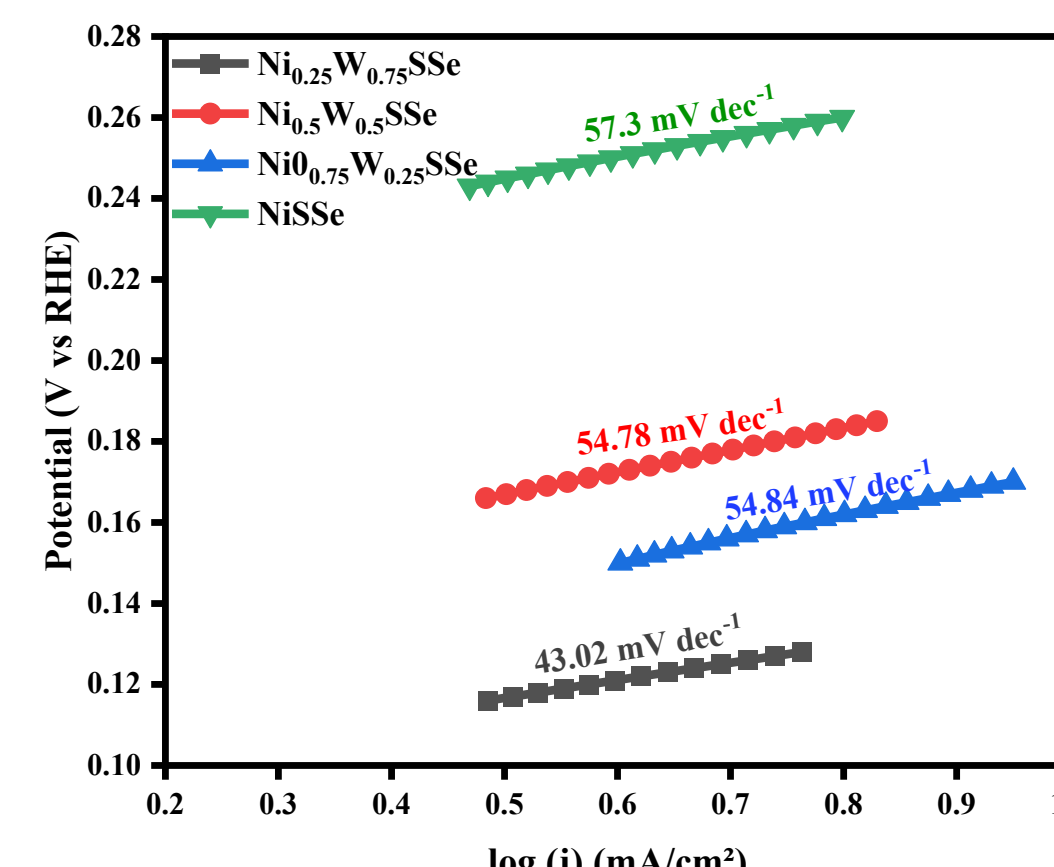


Figure 4. Tafel plots for NiSSe, Ni_{0.25}W_{0.75}SSe, Ni_{0.75}W_{0.25}SSe, and Ni_{0.5}W_{0.5}SSe

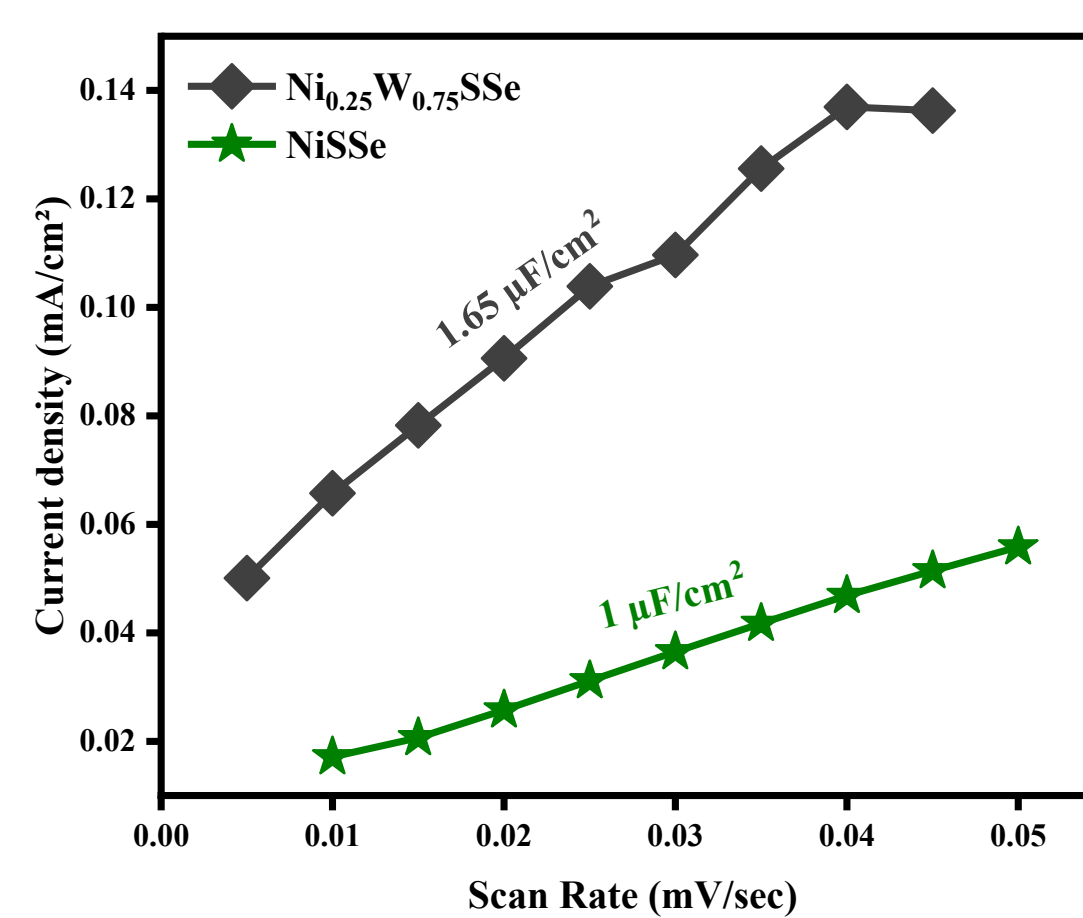


Figure 5. Electrochemical surface area of Ni_{0.25}W_{0.75}SSe and NiSSe

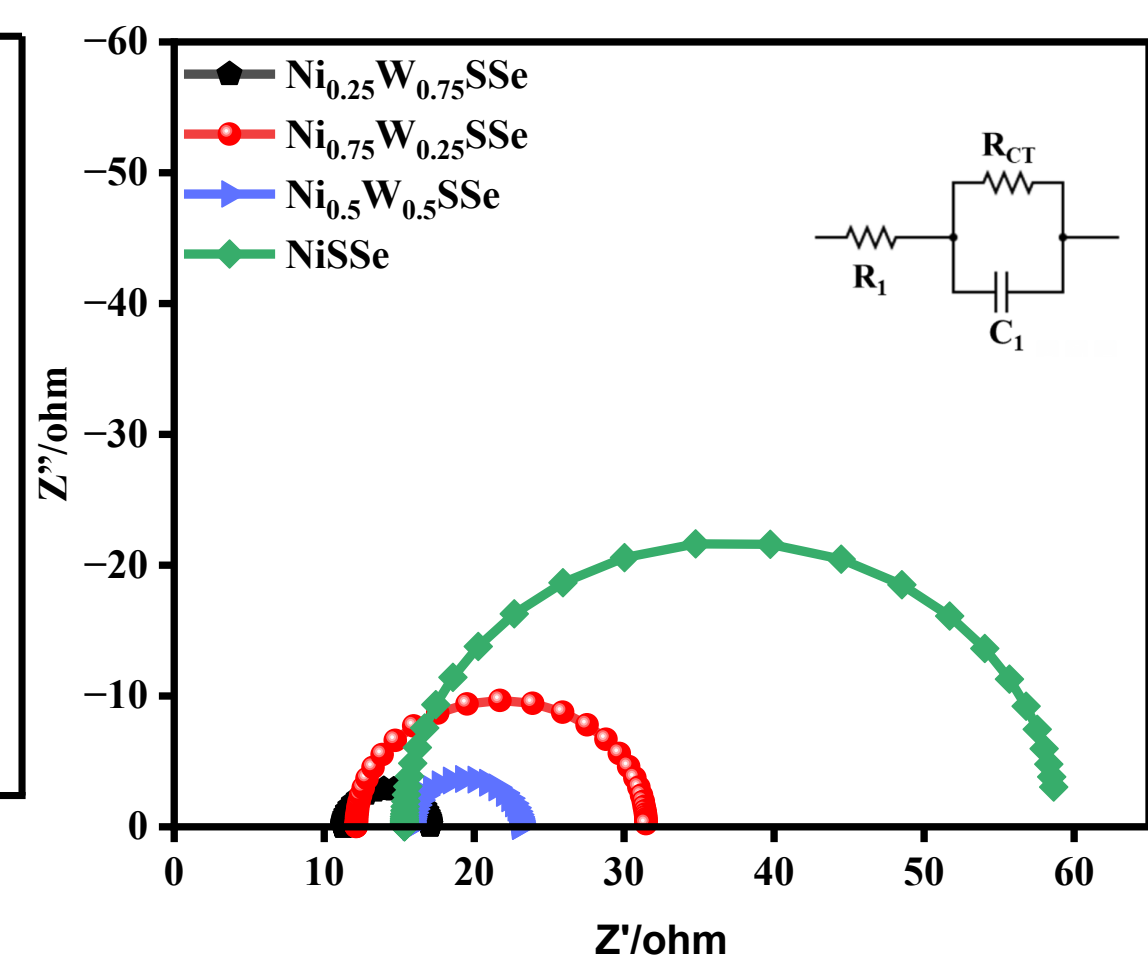


Figure 6. EIS spectra of Ni_{0.25}W_{0.75}SSe, Ni_{0.75}W_{0.25}SSe, Ni_{0.5}W_{0.5}SSe, and NiSSe.

CONCLUSION

Thus, we concluded that Ni_{0.25}W_{0.75}SSe performed better than other prepared electrocatalysts in terms of HER activity. Because it has a low overpotential of 138 mV and a high ECSA of 175.66 cm².

FUTURE WORK / REFERENCES

- Stability Test
- XPS
- HRTEM

- Mandari, K.K., S. Pandey, and M.J.I.J.o.H.E. Kang, Highly efficient ternary NiO/MoS2/BiVO4 heterostructure for electrocatalytic HER/OER applications. 2023.
- Wei, S., et al., Dual-phase MoS2/MXene/CNT ternary nanohybrids for efficient electrocatalytic hydrogen evolution. 2022. 6(1): p. 25.
- Dang, V.D., et al., Surface-plasma-induced one-pot synthesis of N, S-carbon dot intercalated MoS2/graphene nanosheets for highly efficient hydrogen evolution reaction. 2022. 5(10): p. 12817-12827.