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ABSTRACT

Corrosion is a very common natural phenomenon which leads to huge losses especially in the building construction, turbines in the industries and several other fields. In this research we synthesized and developed new coating materials containing ZnO-NiO. The fabricated coating was characterized by using different techniques such as SEM, XRD etc. The efficiency of the coating against corrosion was examined using the Tafel experiments and it was observed that the fabricated coating exhibit excellent anti-corrosion under seawater.

INTRODUCTION

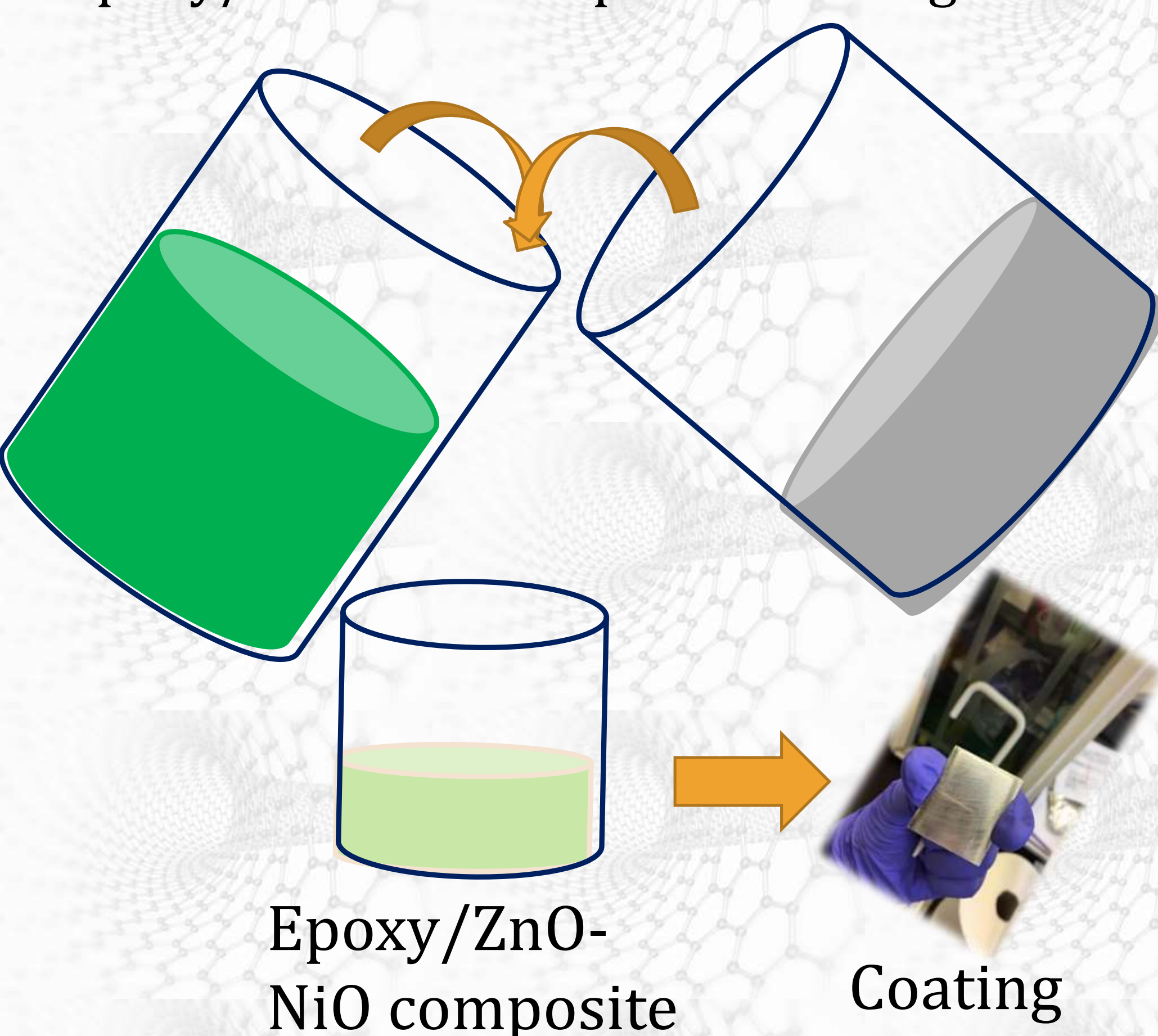
Corrosion is the interaction between the metal and the environment which will damage the properties of the metal itself. Interaction between the metal and oxygen can cause the formation of oxide layers.

In a wet environment, aqueous corrosion can occur due to electrochemical processes which depend upon metal ion transport and reaction. Gradients of metallic and electrolytic ion concentrations, temperature, ambient pressure, and the presence of other metals, bacteria, or active cells, all influence the corrosion rate. electrochemical instruments can tell us if the materials that we coat in the metal are able to prevent the corrosion or not by doing some studies.

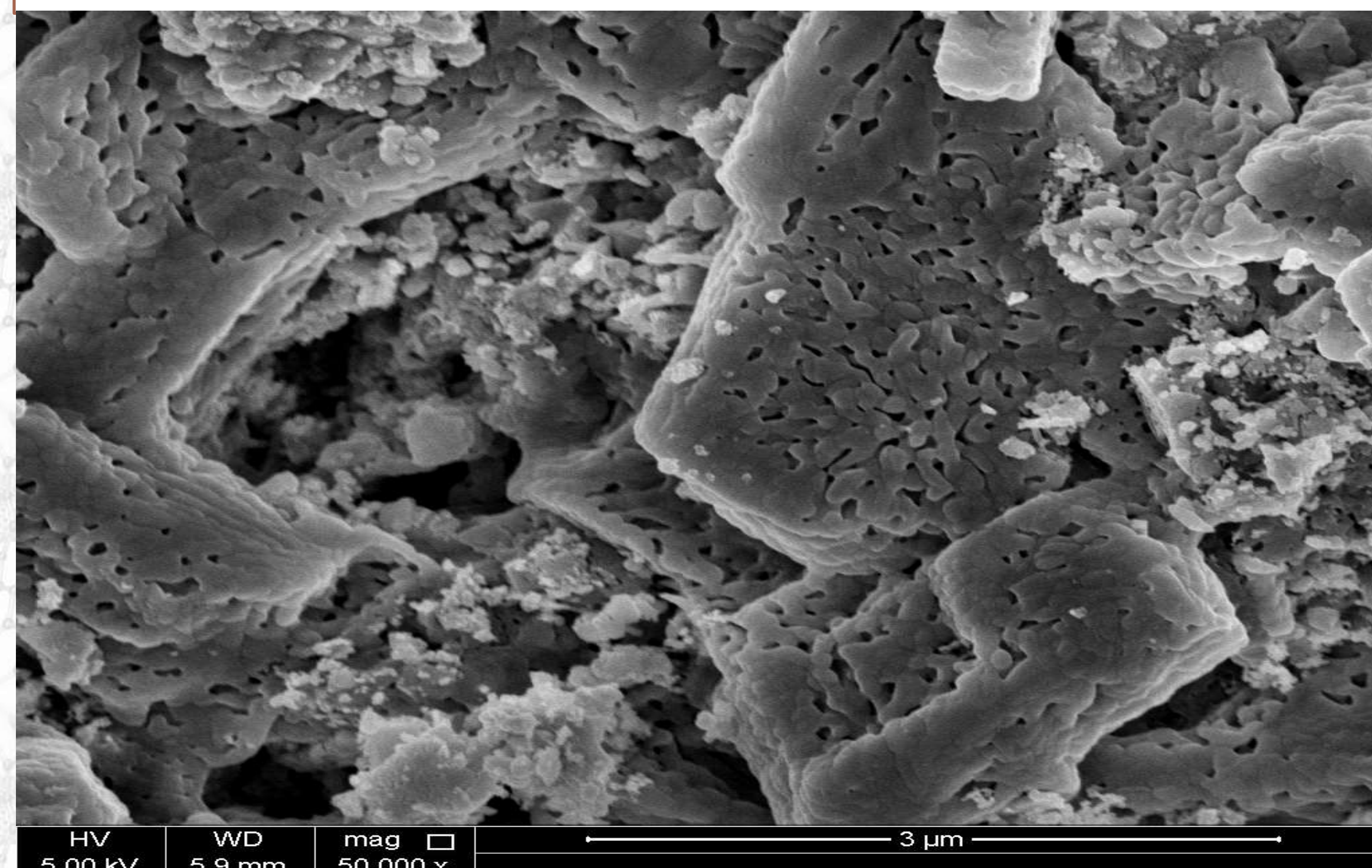


EXPERIMENTAL

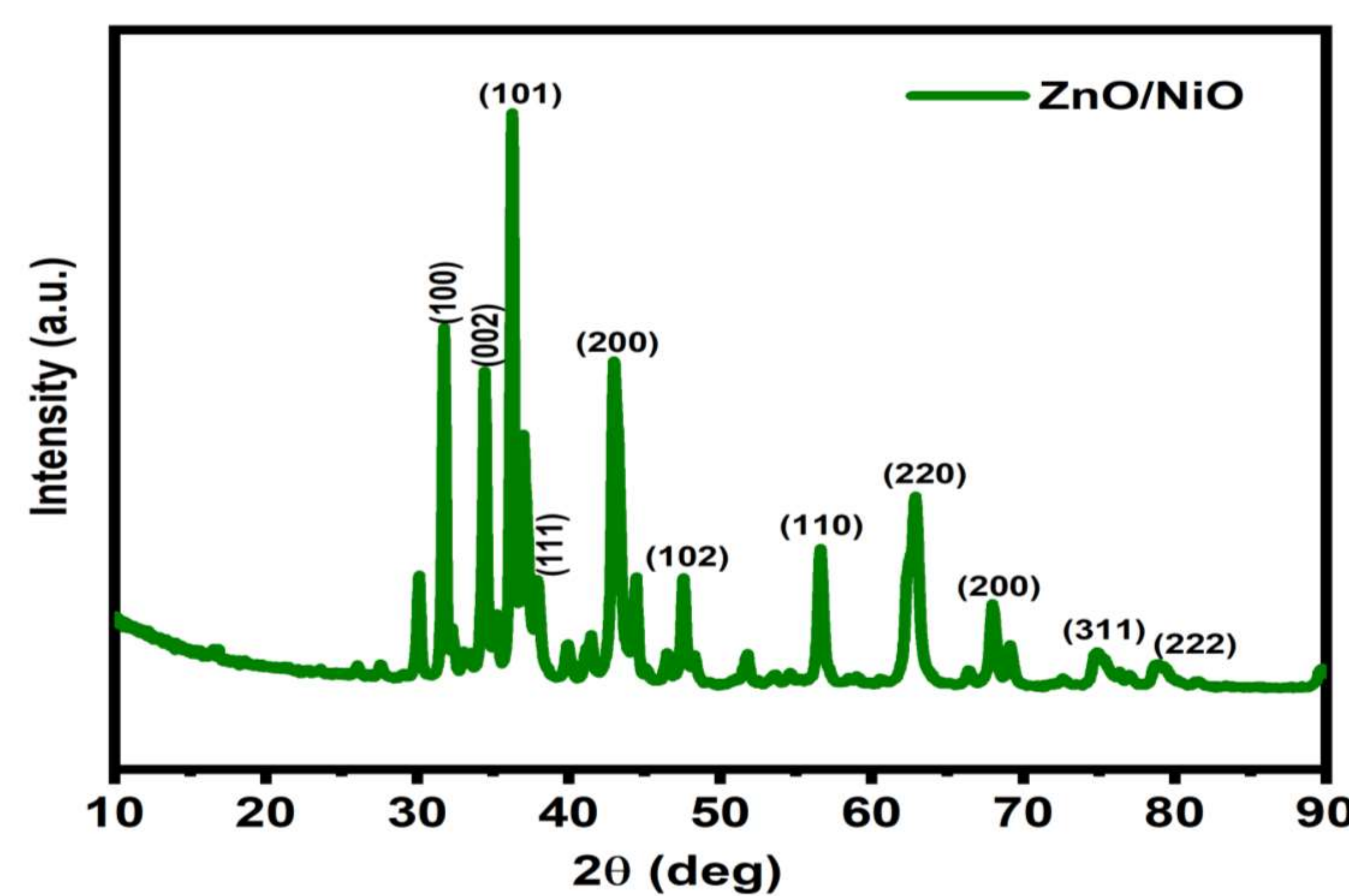
Epoxy/ZnO-NiO composite Coating



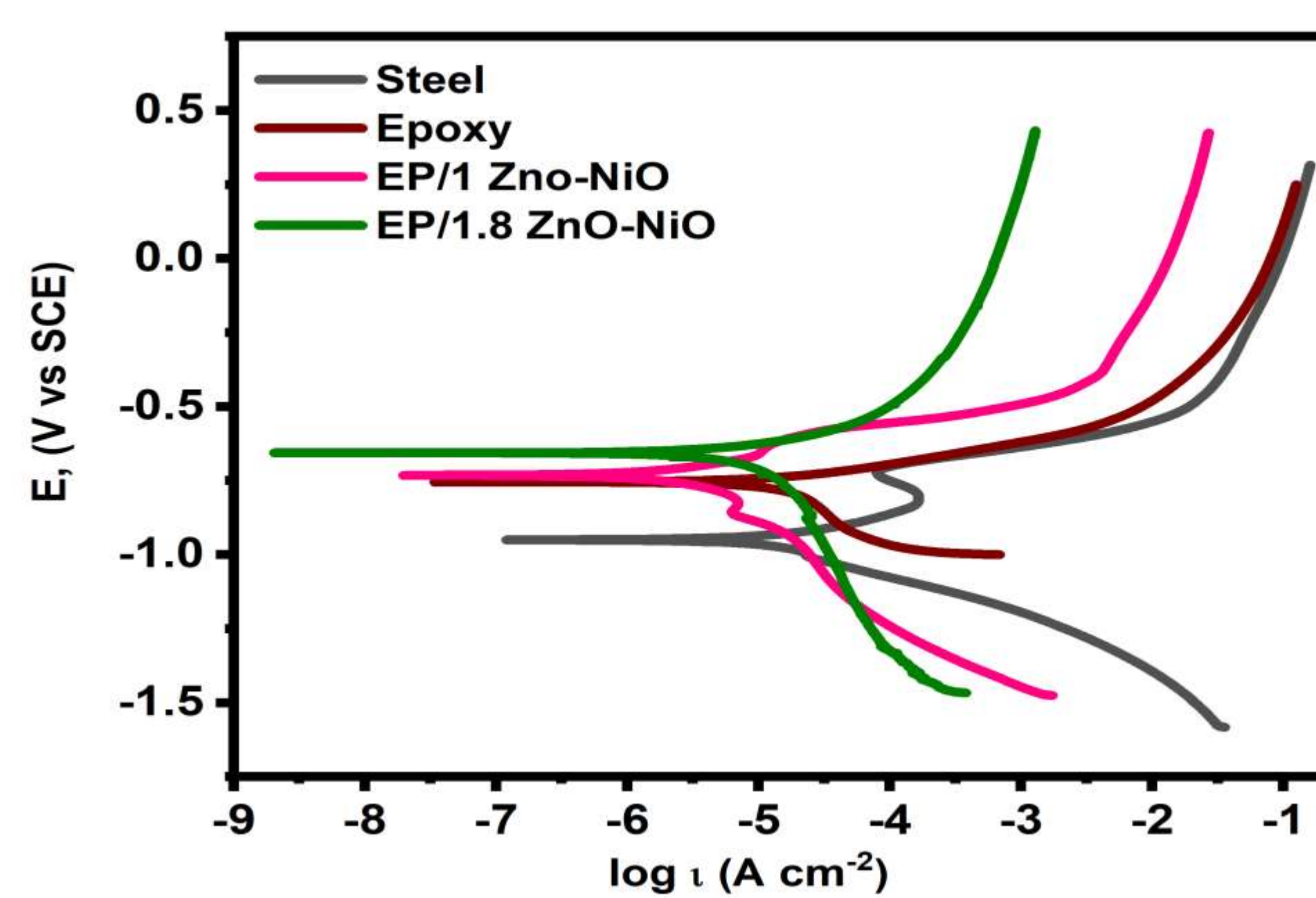
RESULTS & DISCUSSION



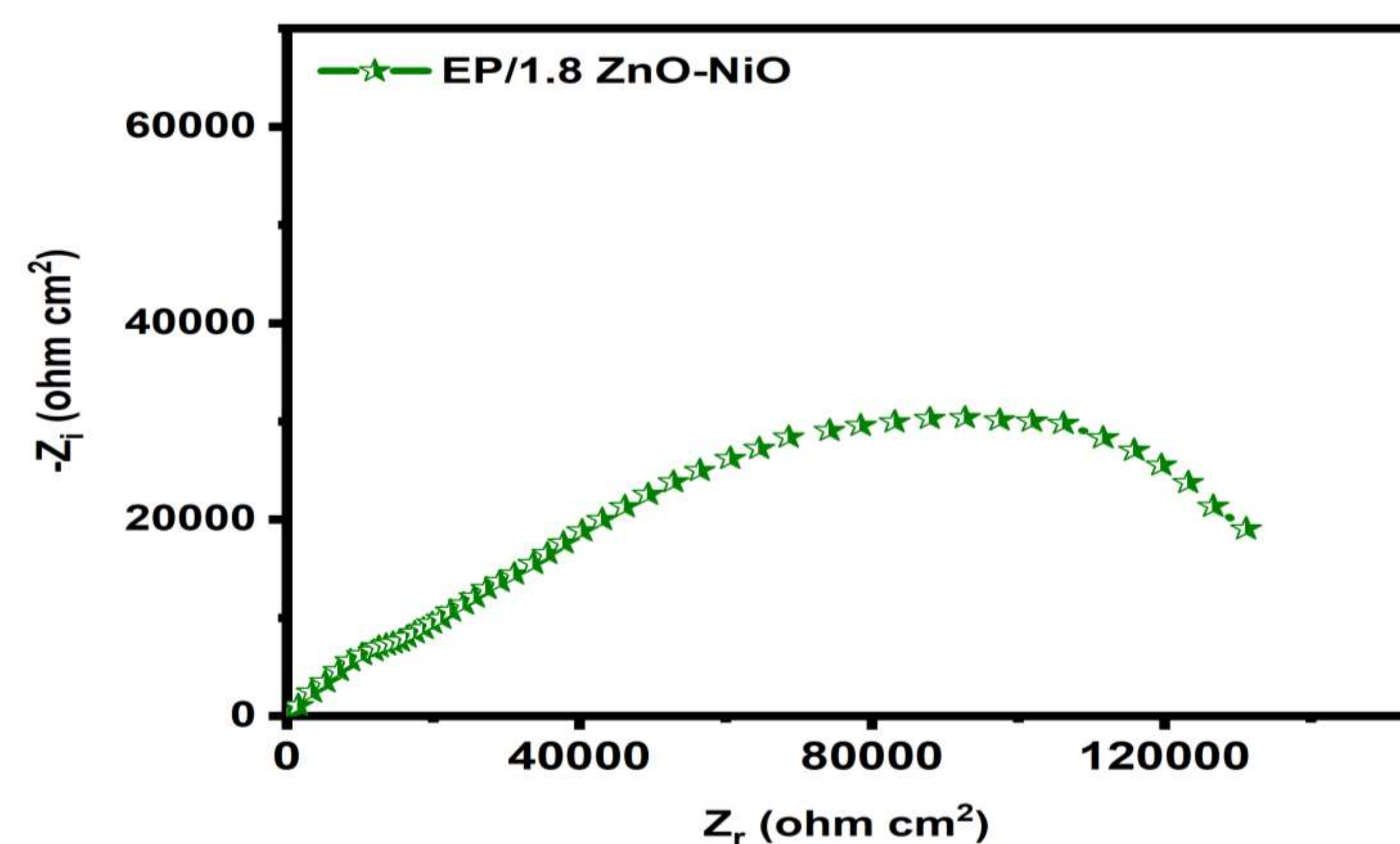
Scanning electron microscope image of ZnO/NiO nanocomposite.



X-ray diffraction pattern of ZnO/NiO nanocomposite.



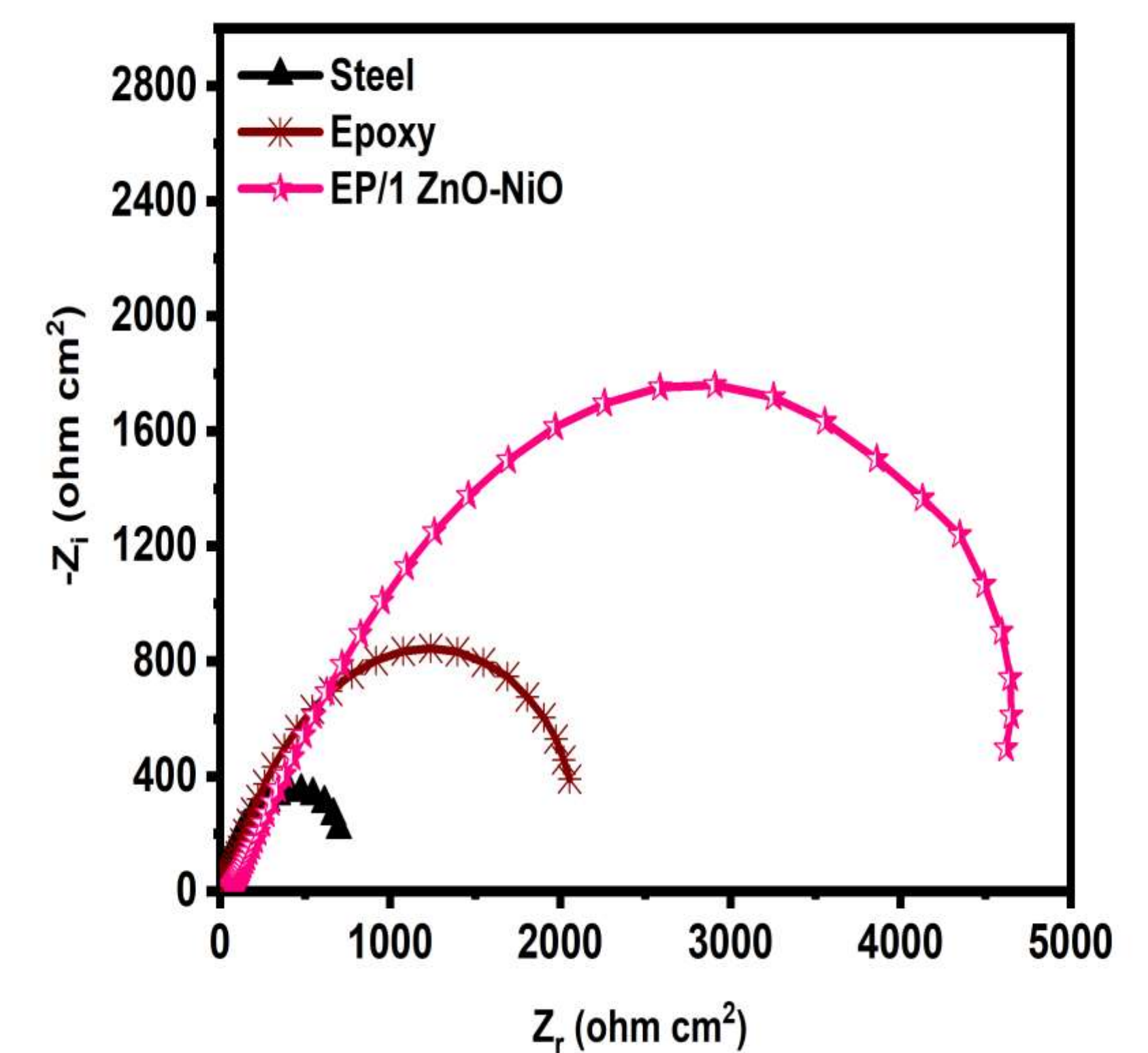
Tafel plots of pure Steel, Epoxy and its composites.



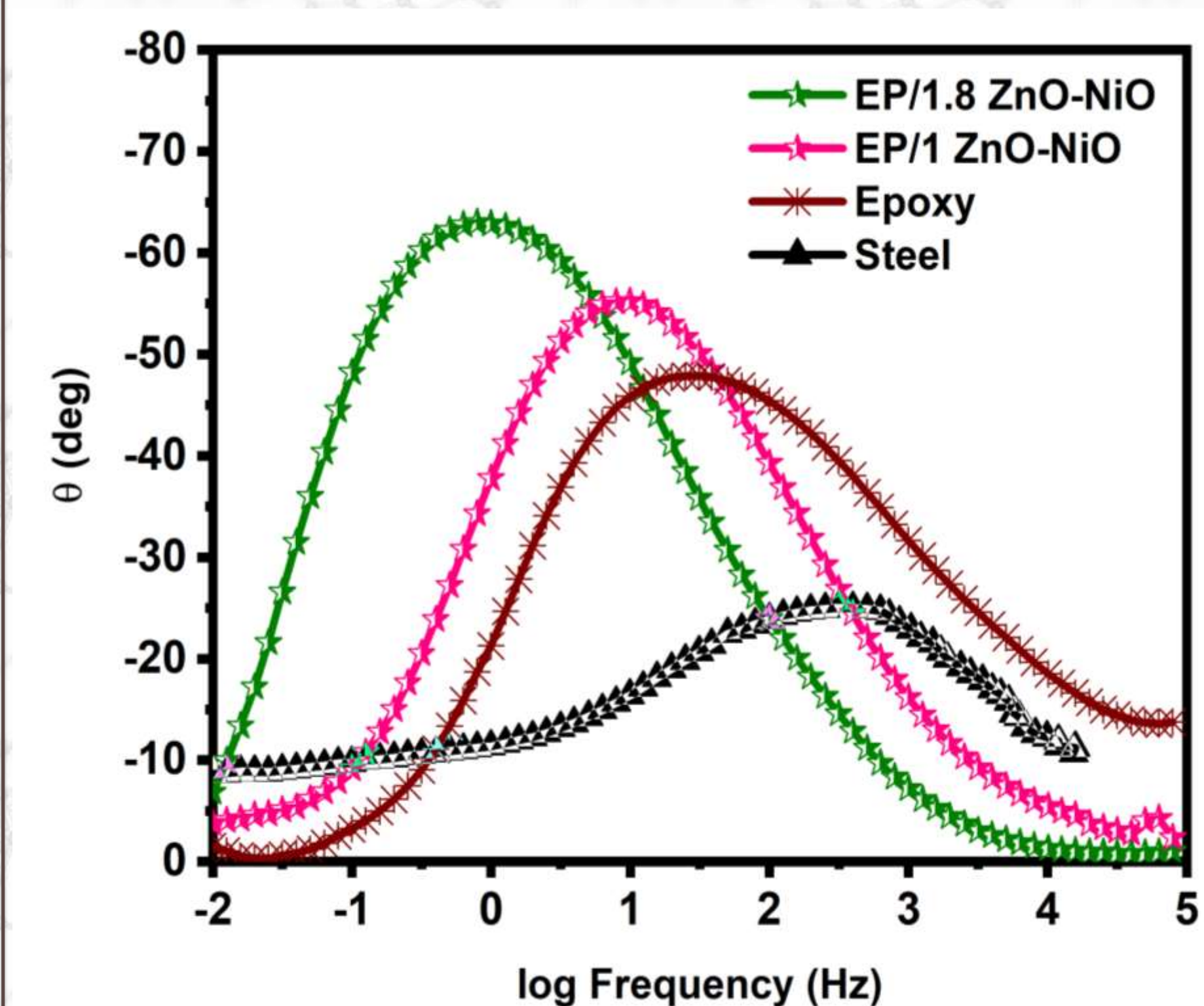
EIS spectra of Epoxy/1.8 ZnO-NiO composite

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EIS spectra of pure steel, Epoxy and EP/1 ZnO-NiO composite.



Frequency-Phase angle curves of pure steel, Epoxy and EP/1 ZnO-NiO, EP/1.8 ZnO-NiO composites.

BENEFITS TO QATAR

The developed coating will be useful in the gas and oil pipelines and industries like Qatar Steel to protect the metals from the corrosion.

CONCLUSION

In this work, a new anticorrosion coating was prepared with addition of the ZnO-NiO as nano fillers. Experimental results proved that the filler can improve the anticorrosion effects of the epoxy. The advantages of the filler can be summarized in the following: (i) The filler has good compatibility with epoxy, which is the basic requirement to implement anticorrosion task. (ii) Using filler as nano filler reduces the permeability of oxygen. The delicate design of the intelligent anticorrosion epoxy/ZnO-NiO coating integrates the excellent physical barrier property which can be used in corrosion protection field.

ACKNOWLEDGEMENTS

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