

Table I. The composition of the different cobalt coatings.

Coatings	CoNi				CoFe							CoFeMn			CoFeMo			CoZn				
	1		2		3	4	5	6	7	8			9			10						
Number of coatings	1		2		3	4	5	6	7	8			9			10						
Composition of coatings, at. %	Co	Ni	Co	Ni	Co	Fe	Co	Fe	Fe	Co	Fe	Co	Fe	Co	Co	Fe	Mn	Co	Fe	Mo	Co	Zn
	40	60	50	50	90	10	80	20	70	30	60	40	50	50	55.7	44	0.3	87	8	8	90	10

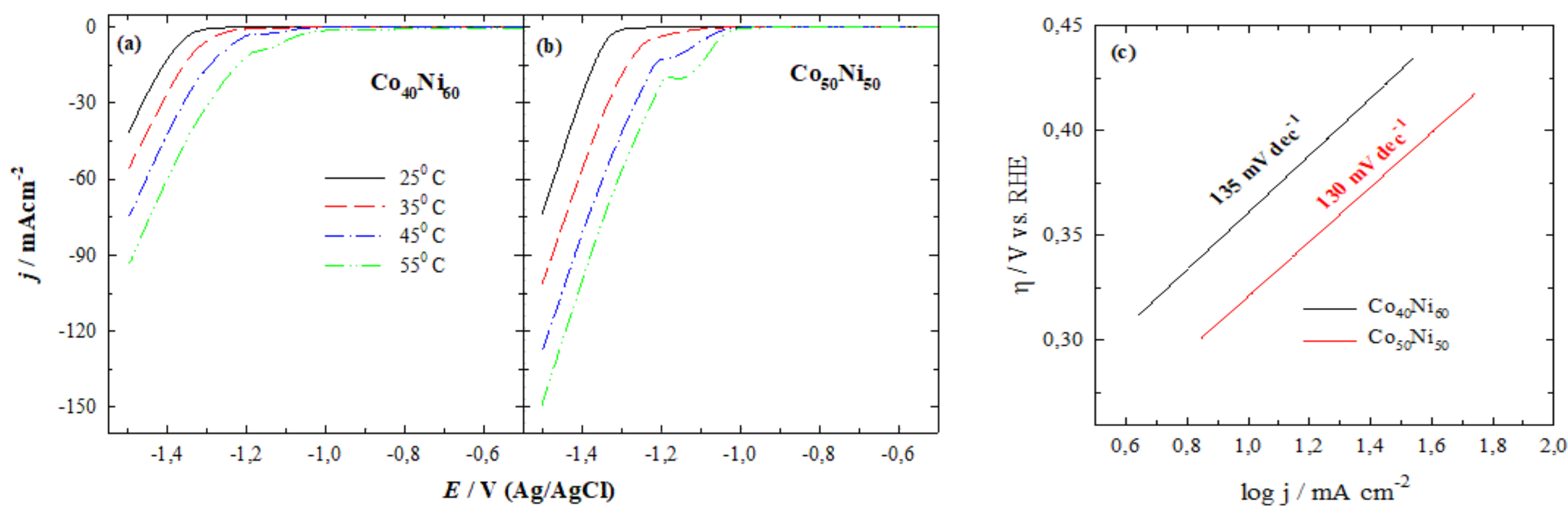


Fig. 1. HER LSVs of the $\text{Co}_{40}\text{Ni}_{60}$ (a) and $\text{Co}_{50}\text{Ni}_{50}$ coatings in 1 M KOH, potential scan rate 5 mVs^{-1} at 25-55 °C. (c) The corresponding Tafel lines of the same with the slope values.

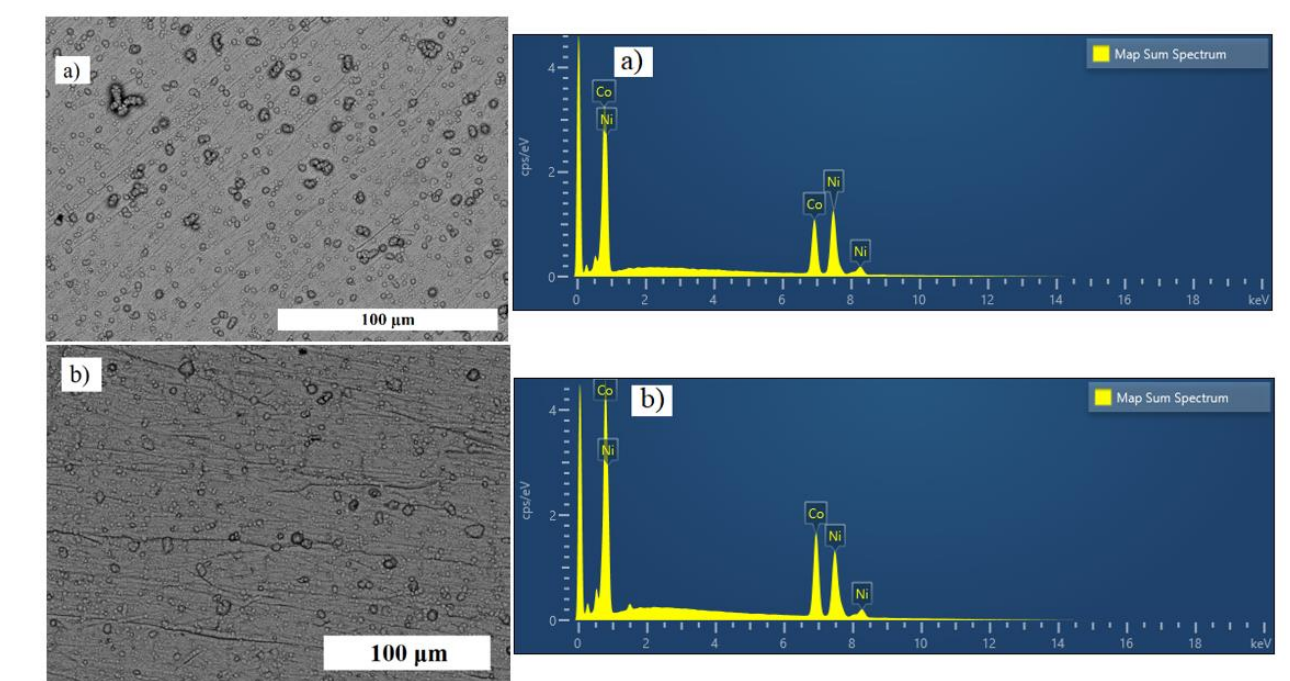


Fig. 2. SEM and EDS analysis of the $\text{Co}_{40}\text{Ni}_{60}$ (a), $\text{Co}_{50}\text{Ni}_{50}$ (b).

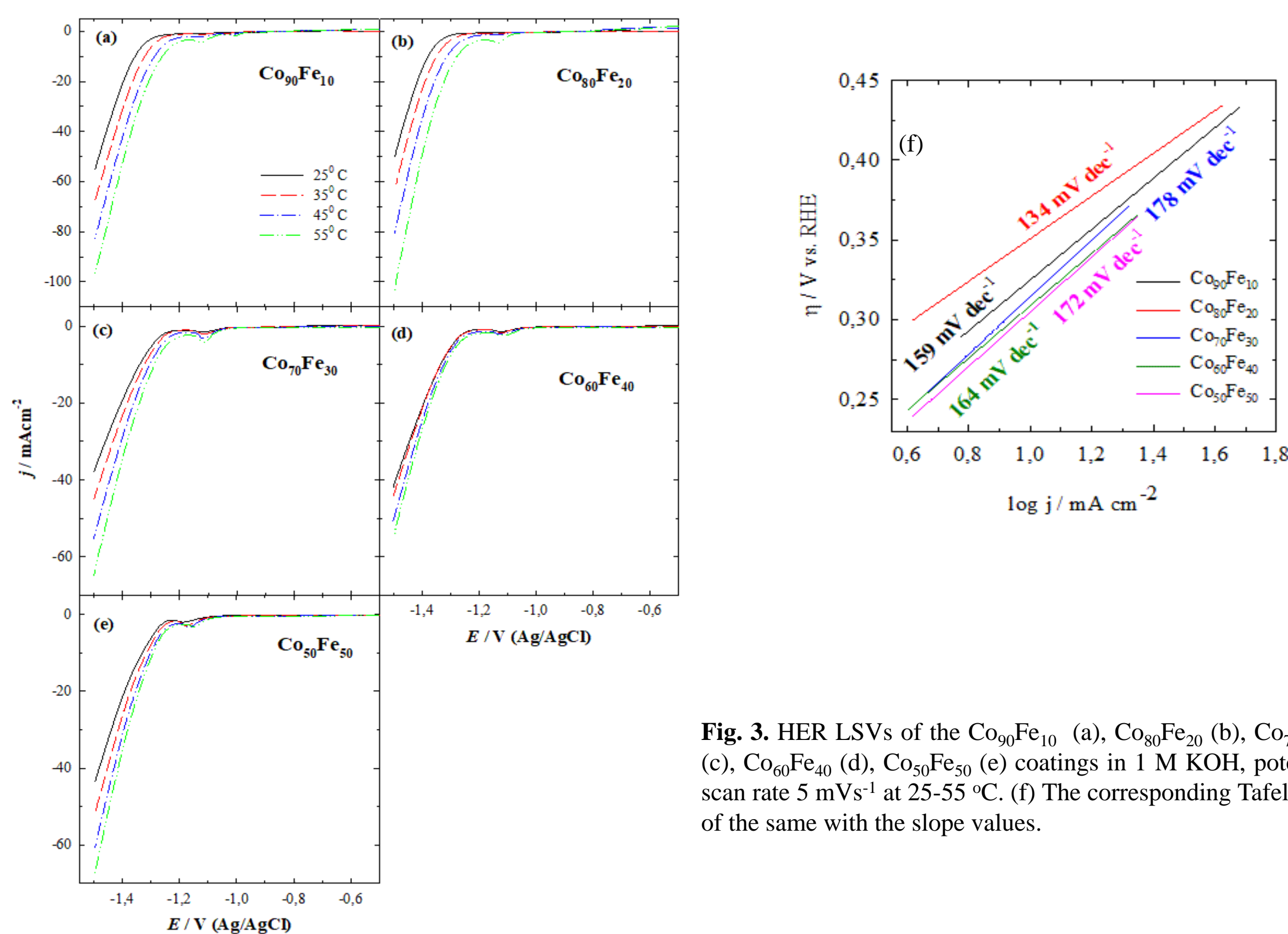


Fig. 3. HER LSVs of the $\text{Co}_{90}\text{Fe}_{10}$ (a), $\text{Co}_{80}\text{Fe}_{20}$ (b), $\text{Co}_{70}\text{Fe}_{30}$ (c), $\text{Co}_{60}\text{Fe}_{40}$ (d), $\text{Co}_{50}\text{Fe}_{50}$ (e) coatings in 1 M KOH, potential scan rate 5 mVs^{-1} at 25-55 °C. (f) The corresponding Tafel lines of the same with the slope values.

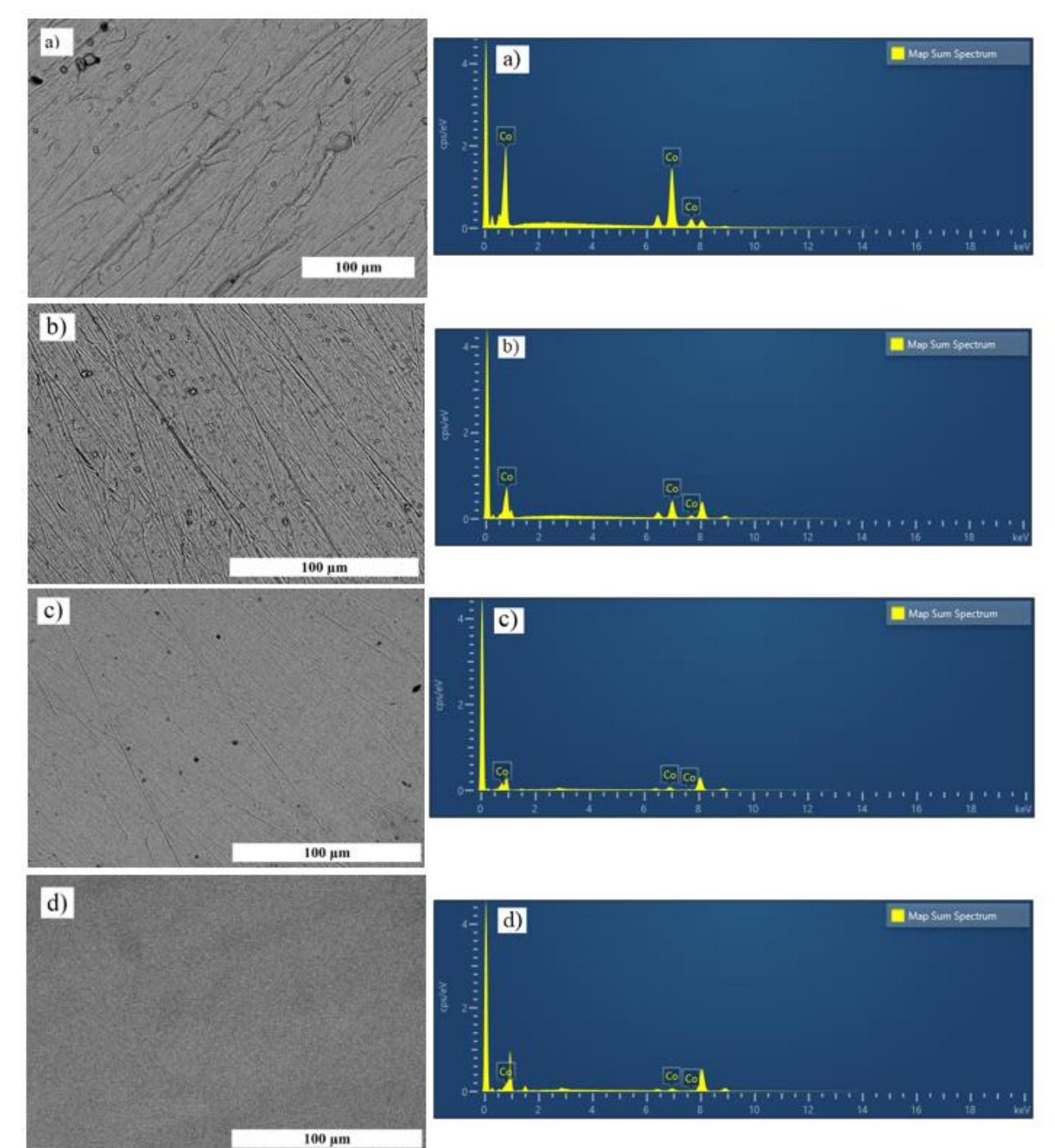


Fig. 4. SEM and EDS analysis of the $\text{Co}_{90}\text{Fe}_{10}$ (a), $\text{Co}_{80}\text{Fe}_{20}$ (b), $\text{Co}_{70}\text{Fe}_{30}$ (c), $\text{Co}_{60}\text{Fe}_{40}$ (d).

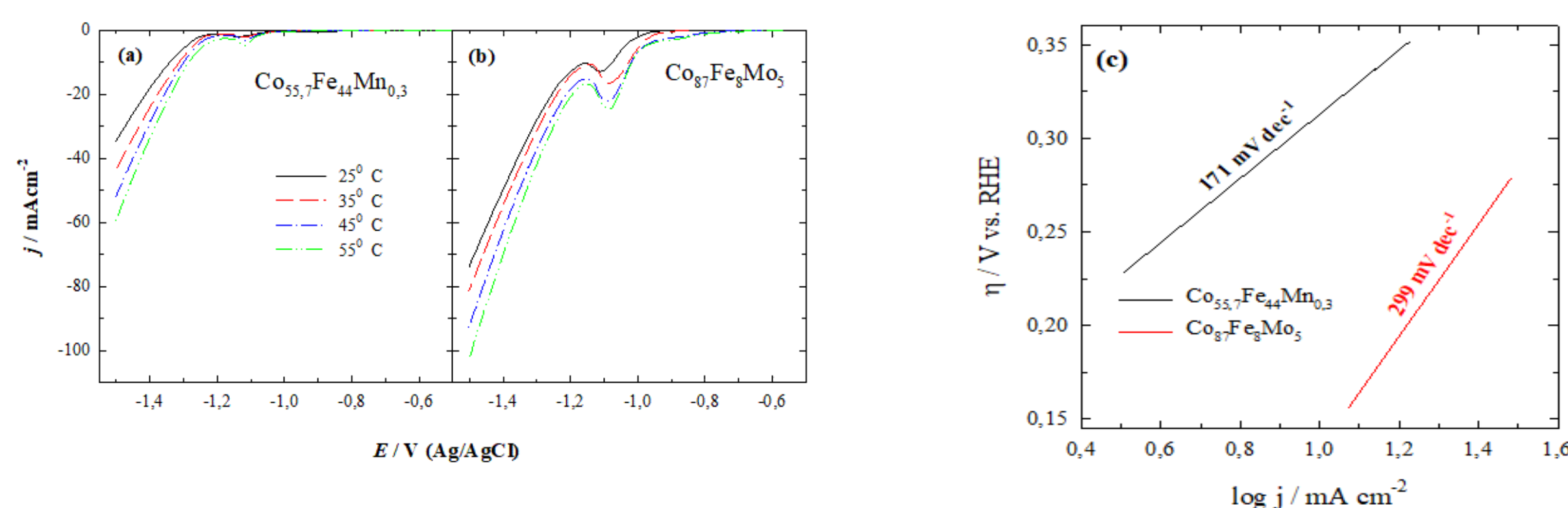


Fig. 6. HER LSVs of the $\text{Co}_{55.7}\text{Fe}_{44}\text{Mn}_{0.3}$ (a), $\text{Co}_{87}\text{Fe}_8\text{Mo}_5$ (b), coatings in 1 M KOH, potential scan rate 5 mVs^{-1} at 25-55 °C. (c) The corresponding Tafel lines of the same with the slope values.

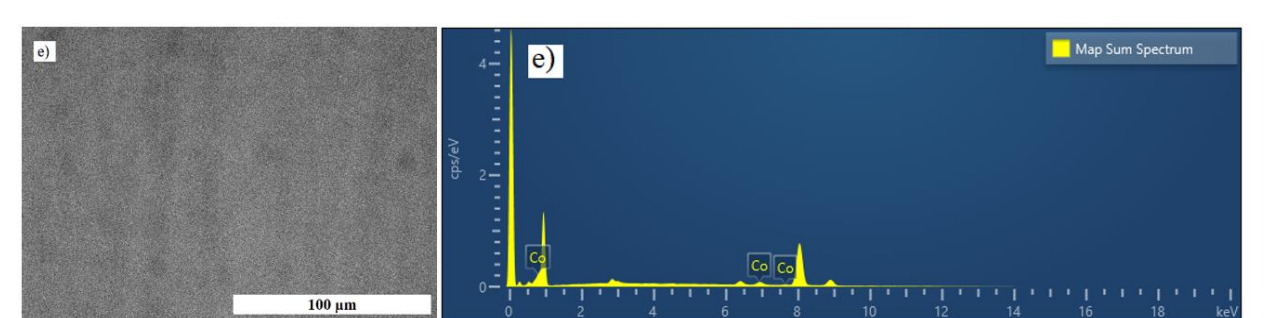


Fig. 5. SEM and EDS analysis of the $\text{Co}_{50}\text{Fe}_{50}$.

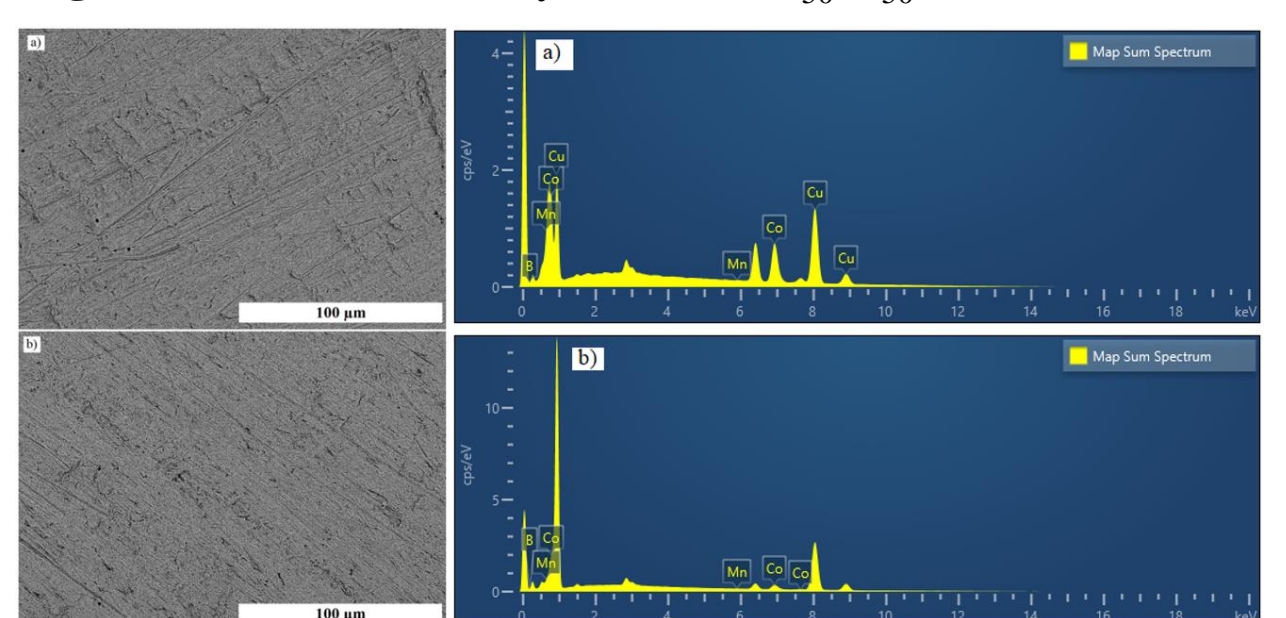


Fig. 7. SEM and EDS analysis of the $\text{Co}_{55.7}\text{Fe}_{44}\text{Mn}_{0.3}$ (a), $\text{Co}_{87}\text{Fe}_8\text{Mo}_5$ (b).

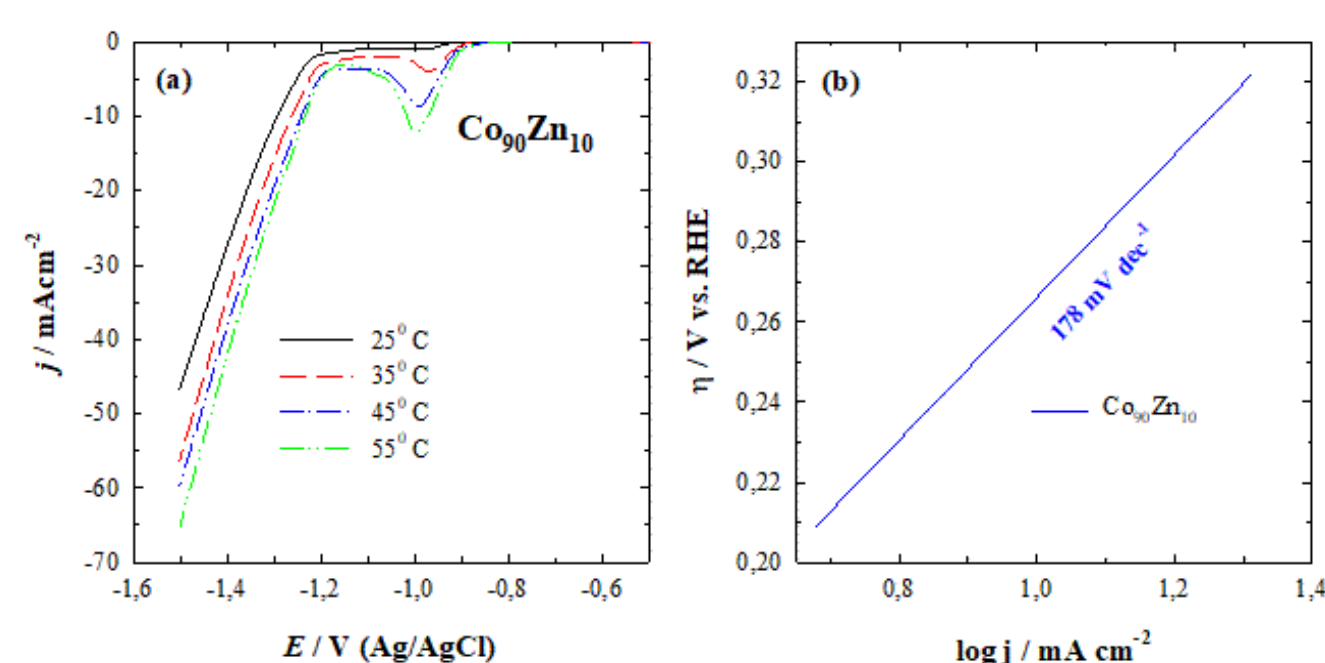


Fig. 8. HER LSVs of the $\text{Co}_{90}\text{Zn}_{10}$ (a) coating in 1 M KOH, potential scan rate 5 mVs^{-1} at 25-55 °C. (b) The corresponding Tafel lines of the same with the slope values.

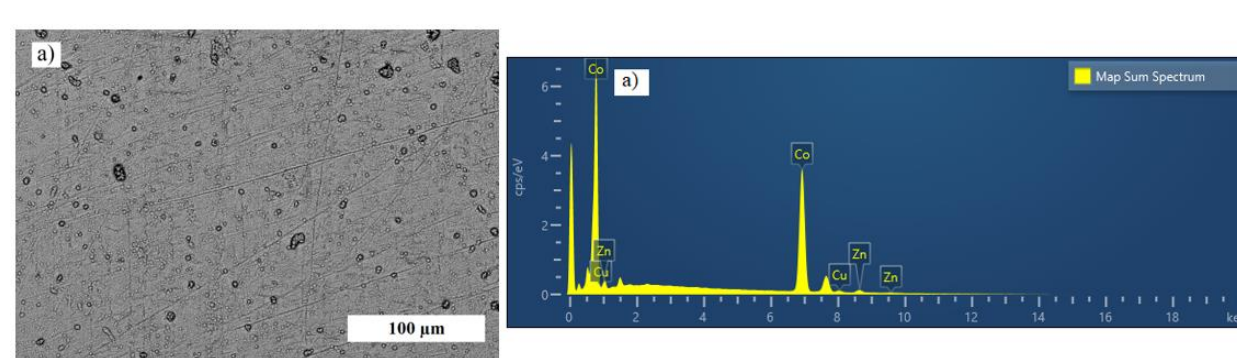


Fig. 9. SEM and EDS analysis of the $\text{Co}_{90}\text{Zn}_{10}$.

CONCLUSIONS

- ✓ The all formed composites are catalytically active for the HER.
- ✓ Notably, the highest catalytic hydrogen evolution performance with a Tafel slope of 299 mV dec^{-1} was obtained using the $\text{Co}_{87}\text{Fe}_8\text{Mo}_5$ catalyst.