

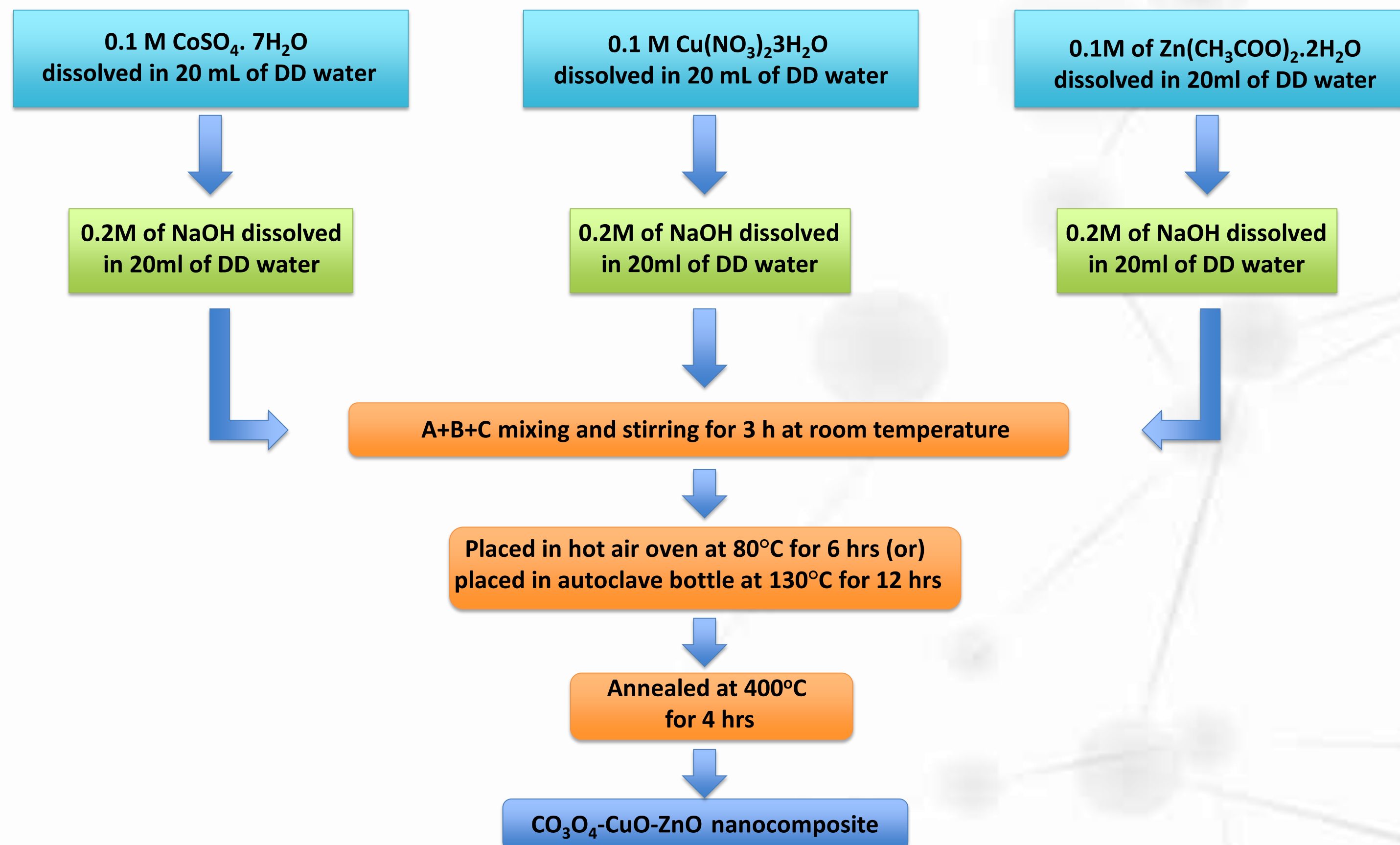
ABSTRACT

Acetone in breath can be used as a biomarker for noninvasive detection of diabetes. The acetone level in breath is substantially high for diabetic patients. In this study, mixed metal oxide nanocomposite of CuO-Co₃O₄-ZnO was used for the electrochemical detection of acetone in artificial breath solution. The structural and morphological characterization of synthesized nanocomposite was done by XRD, RAMAN and SEM (EDAX) analysis. The electrochemical study was performed and the metal oxide modified electrode showed the sensitivity of 6.52 $\mu\text{A cm}^{-2} \text{ppm}^{-1}$ towards the detection of acetone in the artificial solution.

INTRODUCTION

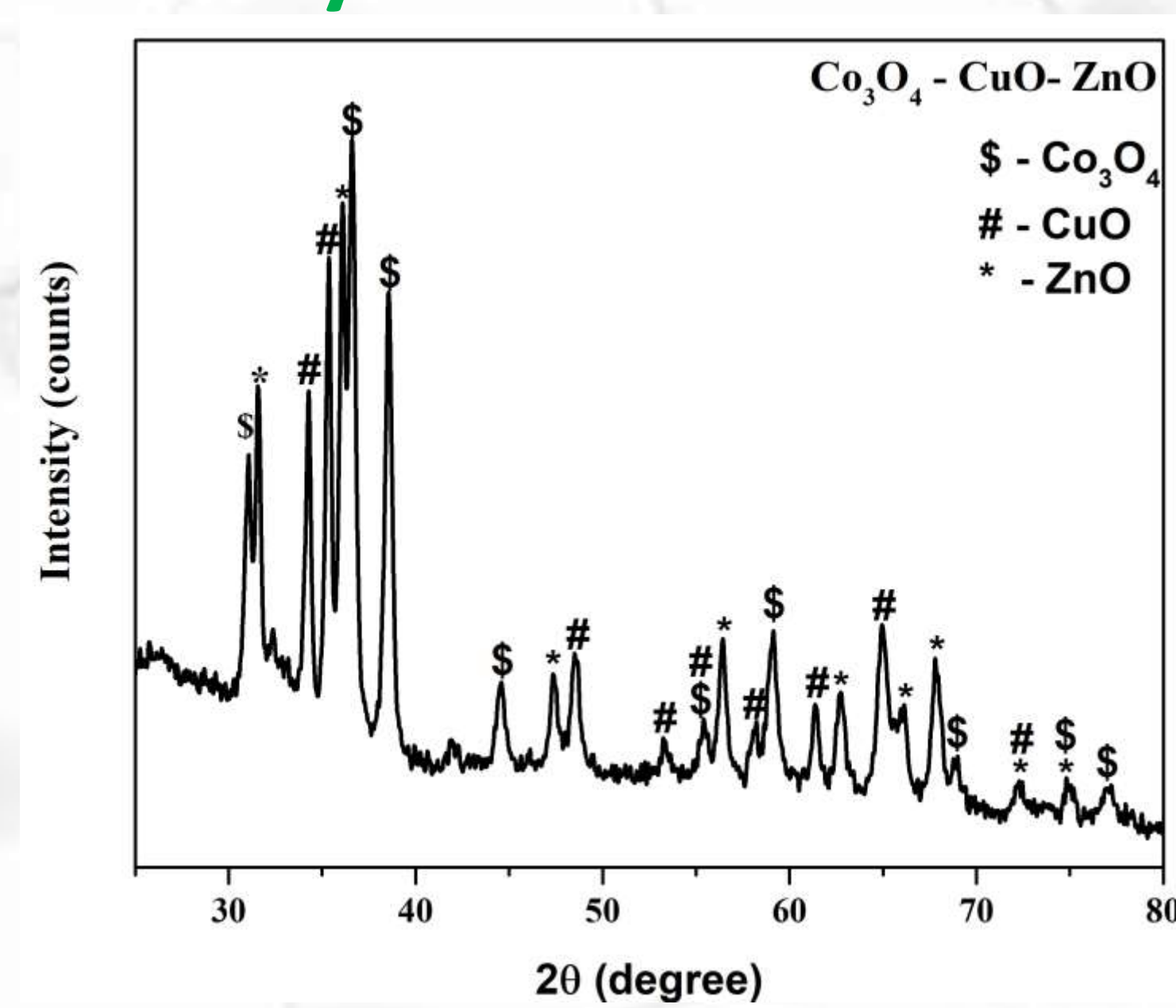
- Metal oxide based chemical sensors are widely used because of large active area available for the redox reactions.
- The non invasive detection of diabetes is possible by measuring the acetone level in sweat.
- Electrochemical method has been used for the study because of the simplicity and flexibility of the technique.
- Fabrication of high sensitive sensor is required for the detection of acetone.

EXPERIMENTAL



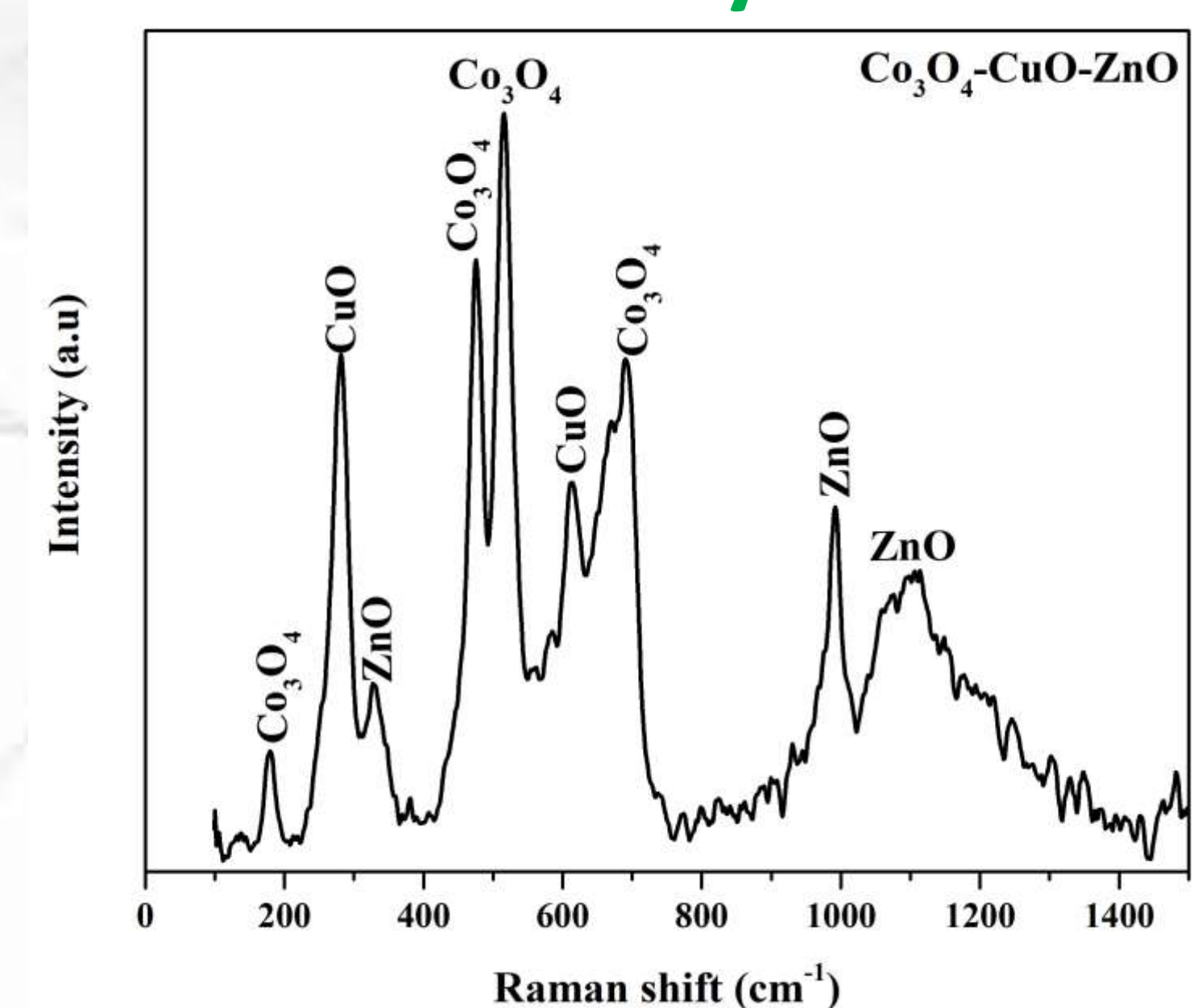
RESULTS & DISCUSSION

X-ray diffraction



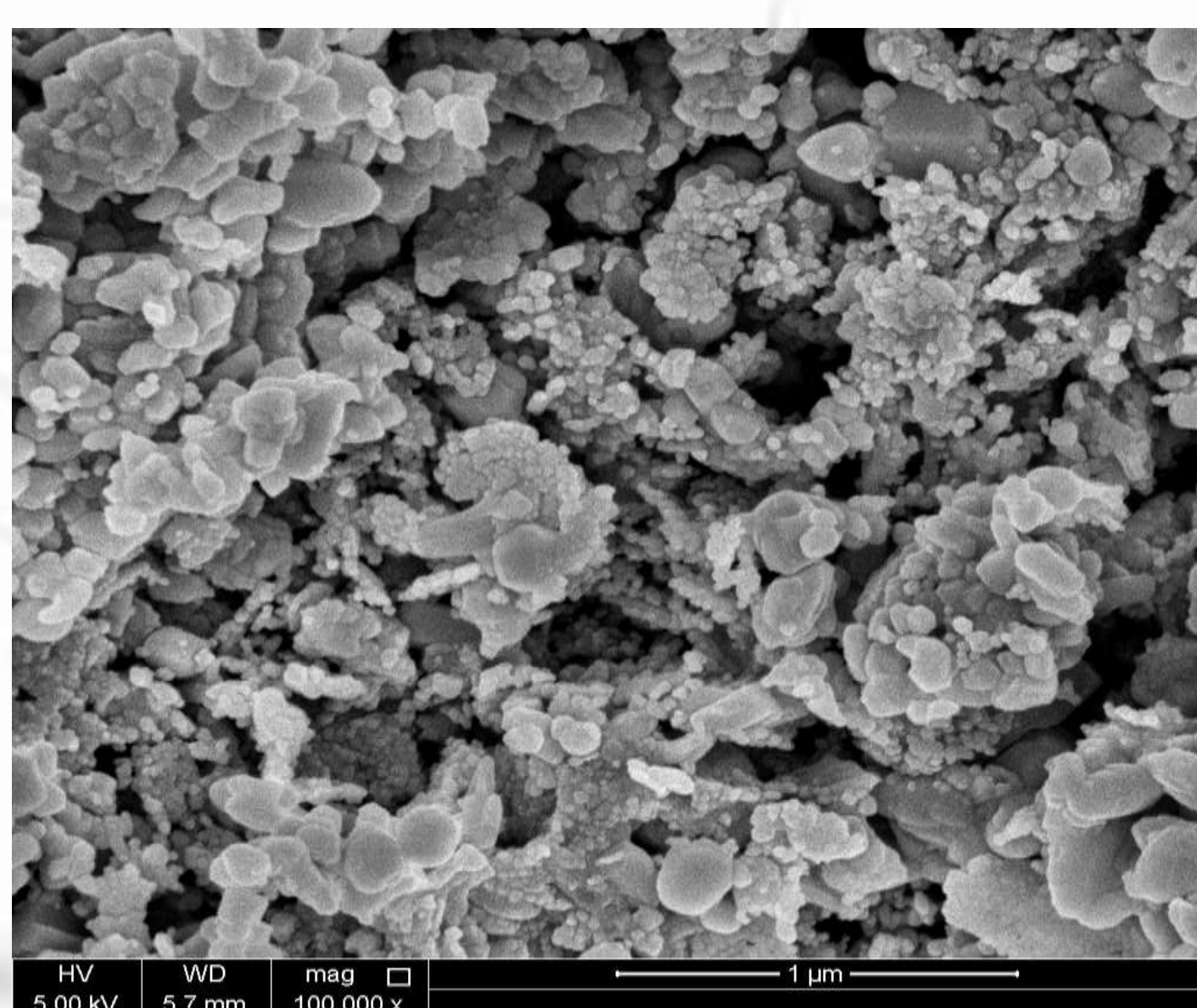
X-ray diffraction graph of CuO-Co₃O₄-ZnO

RAMAN Analysis

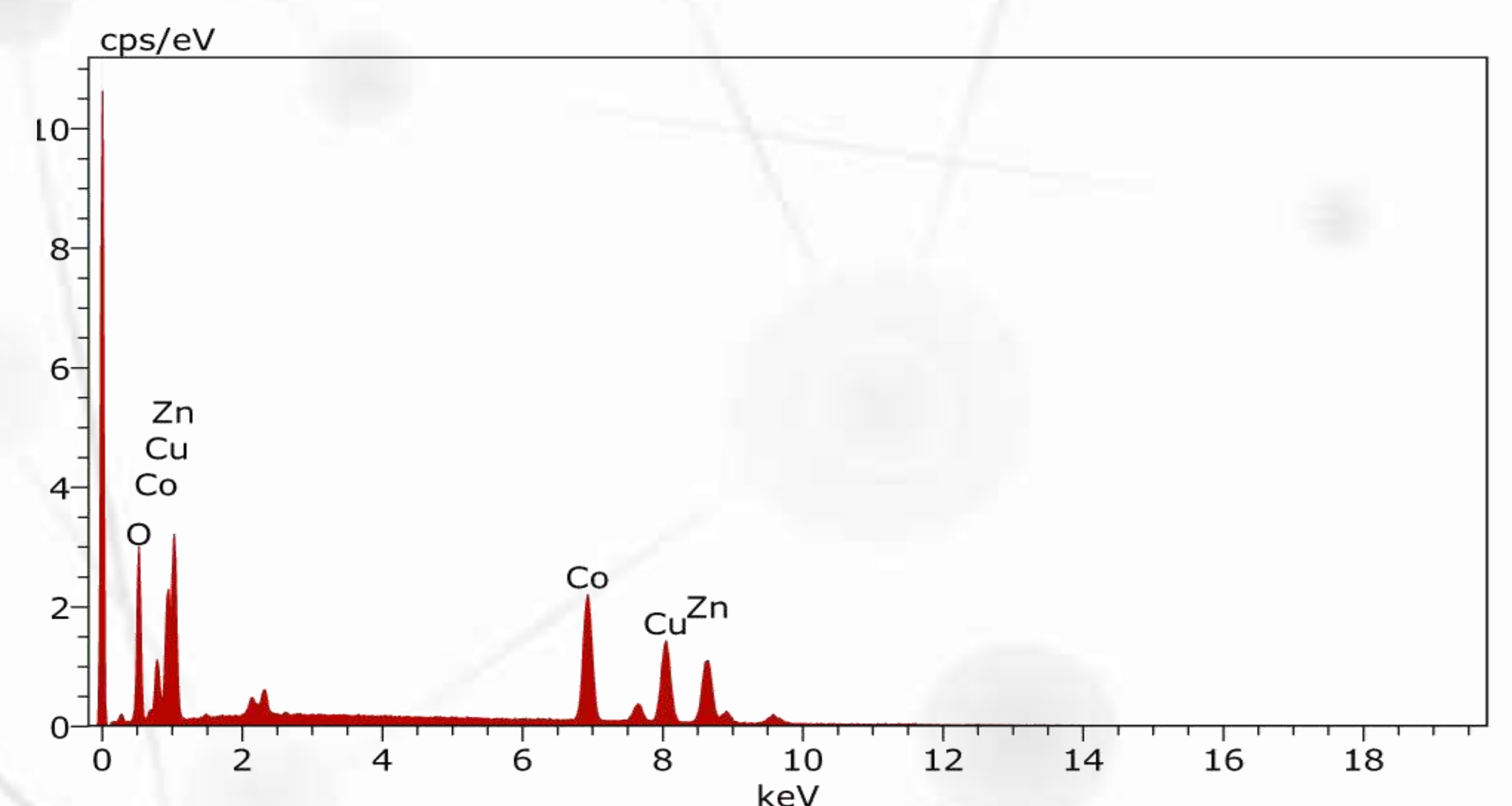
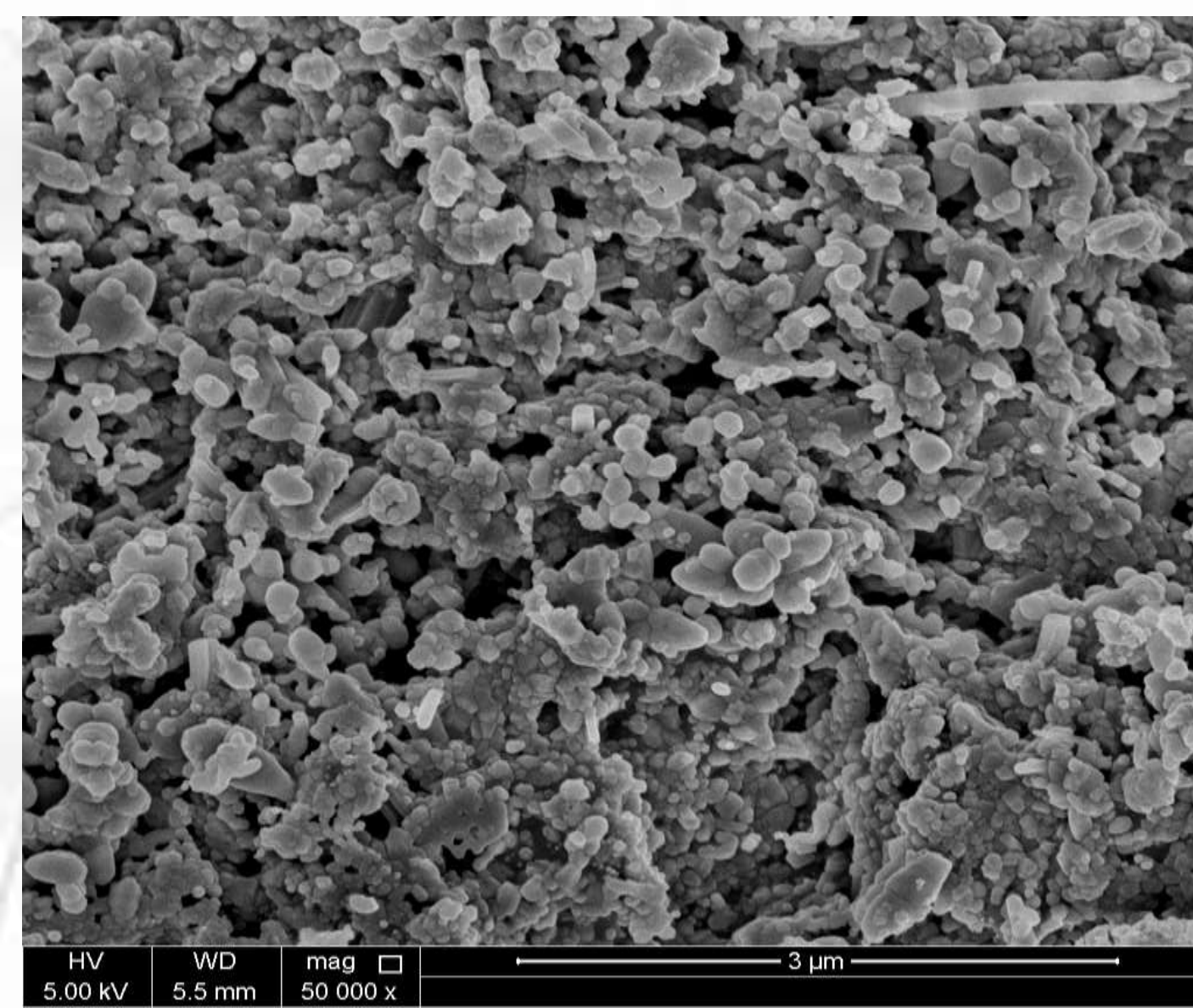


Raman Spectrum of CuO-Co₃O₄-ZnO

SEM with EDAX

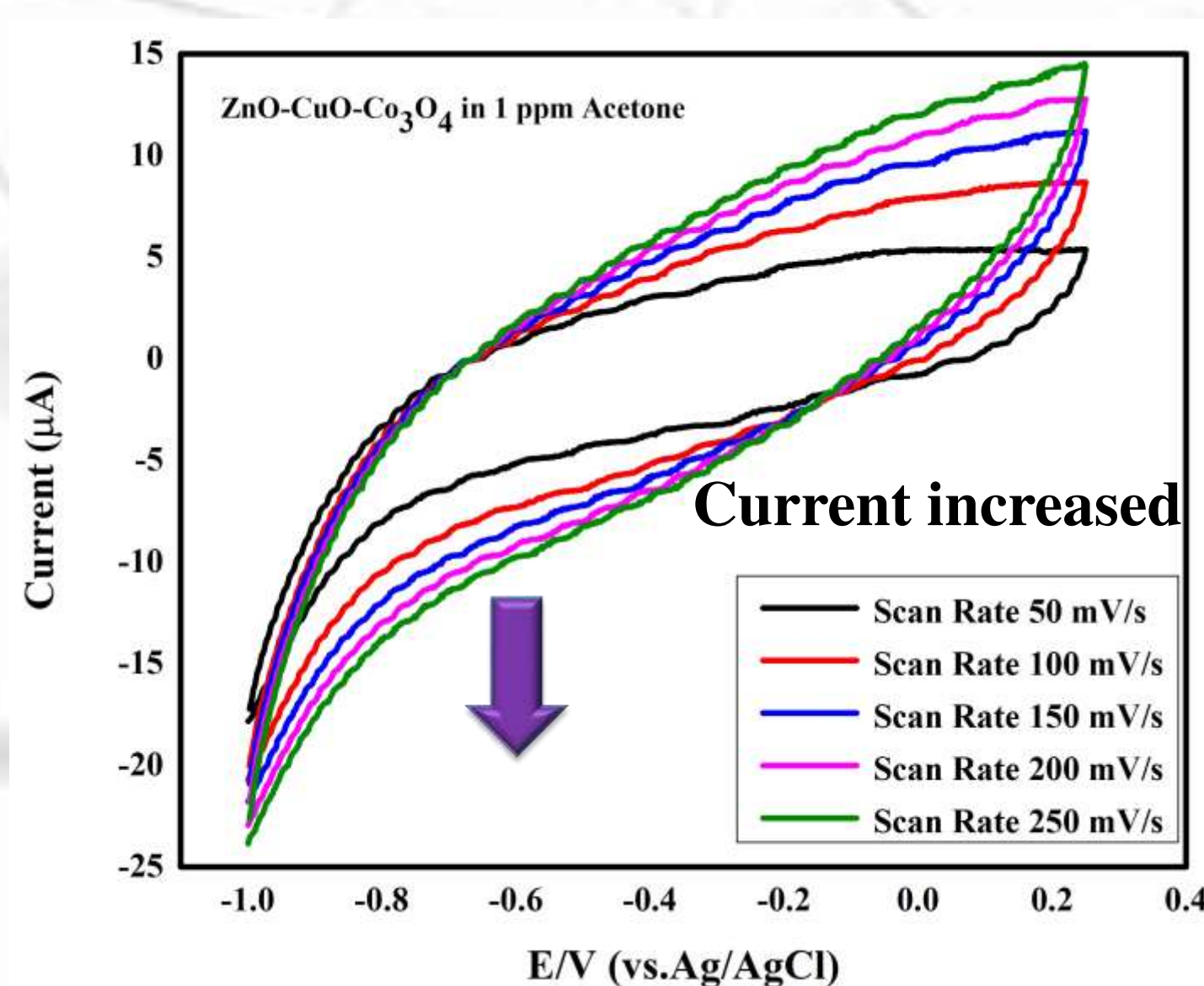


SEM micrograph at 1 μm and 3 μm of CuO-Co₃O₄-ZnO

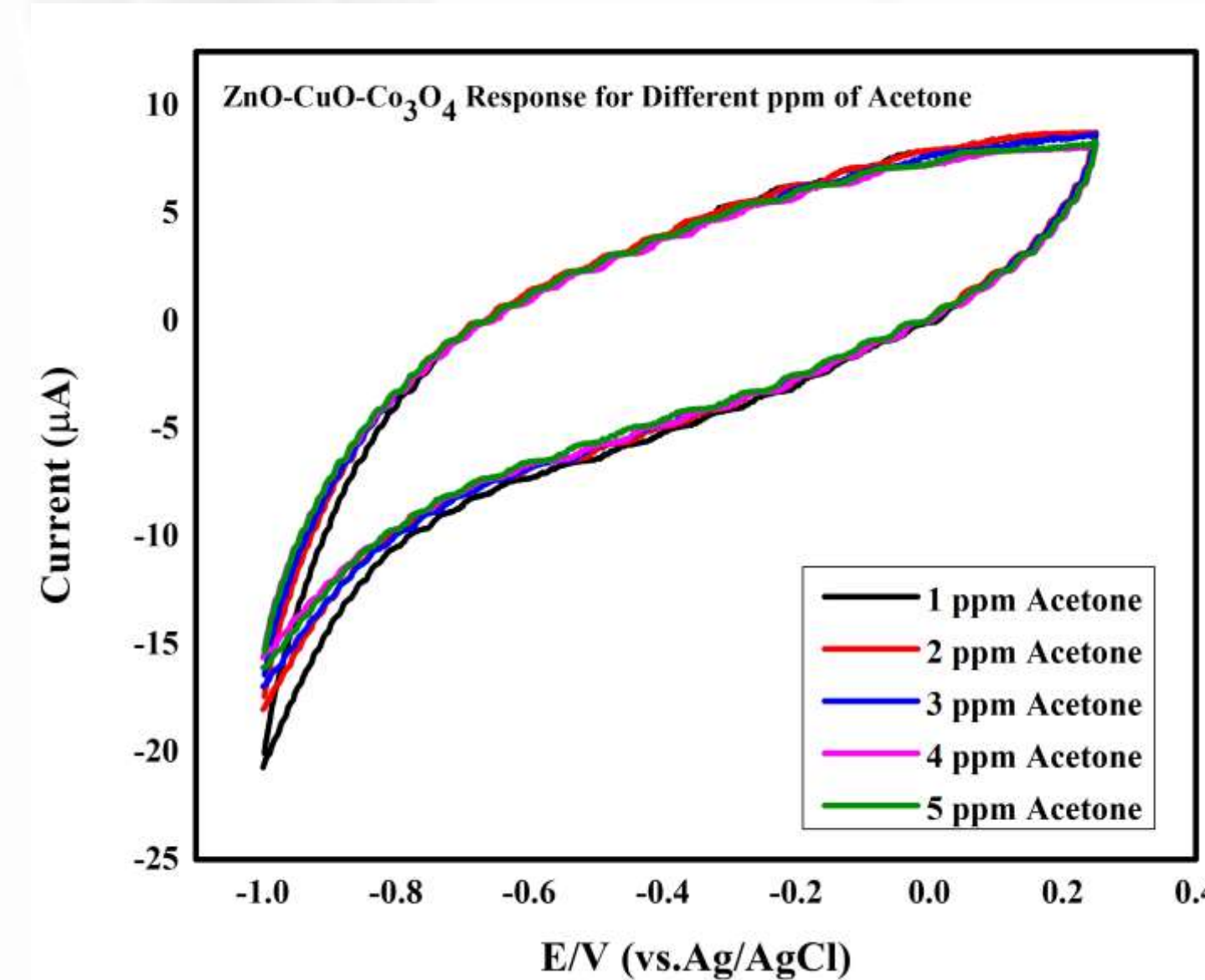


EDAX image of CuO-Co₃O₄-ZnO nanocomposite

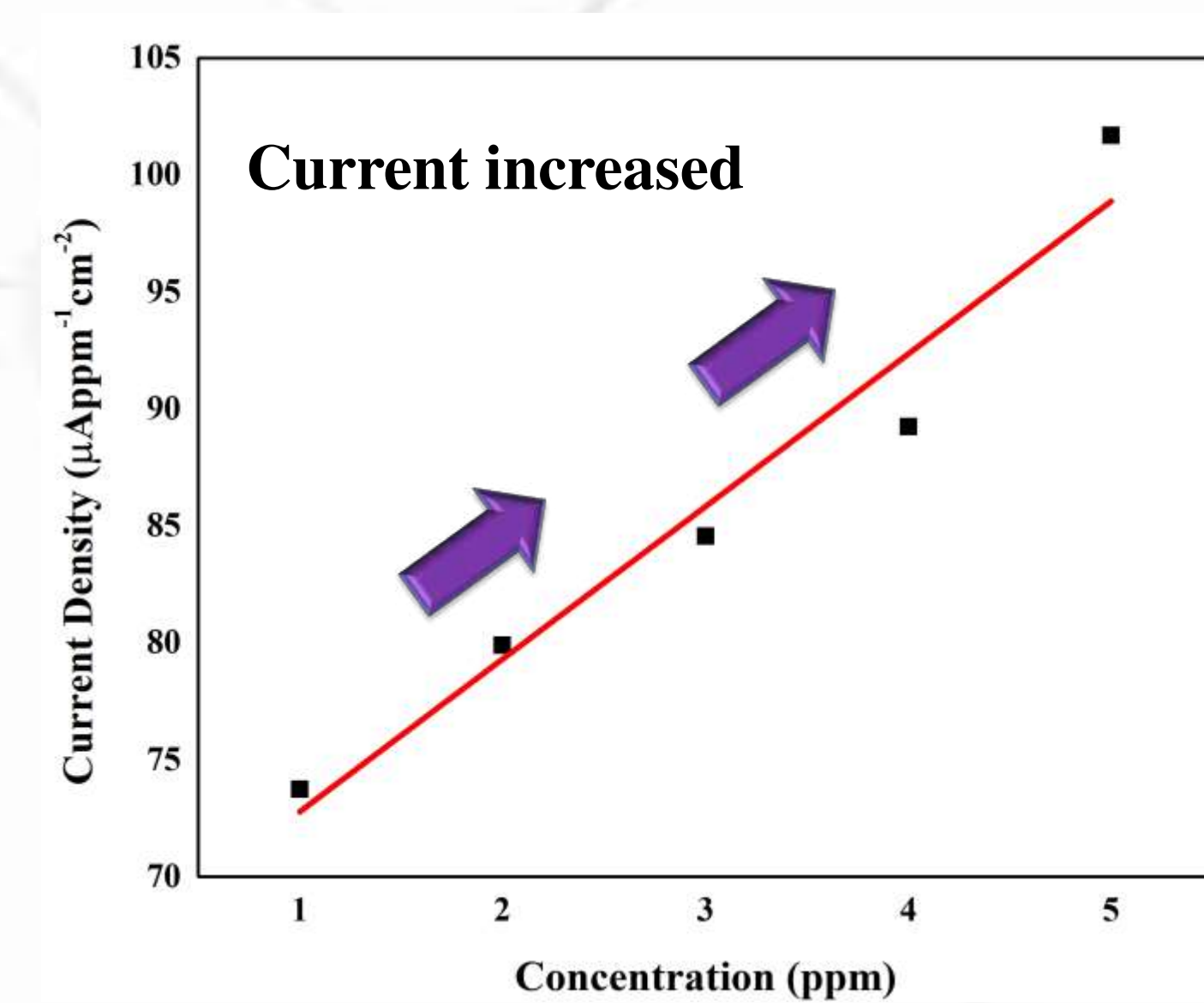
Electrochemical Studies



Modified electrode response for different scan rates



Modified electrode response for different acetone concentration



Current Density vs. Concentration of Acetone

CONCLUSION

- XRD, RAMAN and SEM results show the structural and morphological properties of the synthesised CuO-Co₃O₄-ZnO
- The modified electrode shows a sensitivity of 6.52 $\mu\text{A ppm}^{-1}\text{cm}^{-2}$
- The sensor can be used for non invasive detection of diabetes.

BENEFITS TO QATAR

Electrochemical noninvasive detection of acetone is very useful for diabetes diagnostics by prepared nanocomposite and also for applications in diabetes patients at Qatar hospitals.

ACKNOWLEDGEMENTS

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2. M. M. Rahman, S. Bahadar, A. Jamal, M. Faisal, and A. M. Asiri, "Fabrication of highly sensitive acetone sensor based on sonochemically prepared as-grown Ag₂O nanostructures," *Chem. Eng. J.*, vol. 192, pp. 122–128, 2012.