

# Room Temperature stabilization and synthesis of nanostructured poly (amic) acid membranes for water purification.



## Abstract

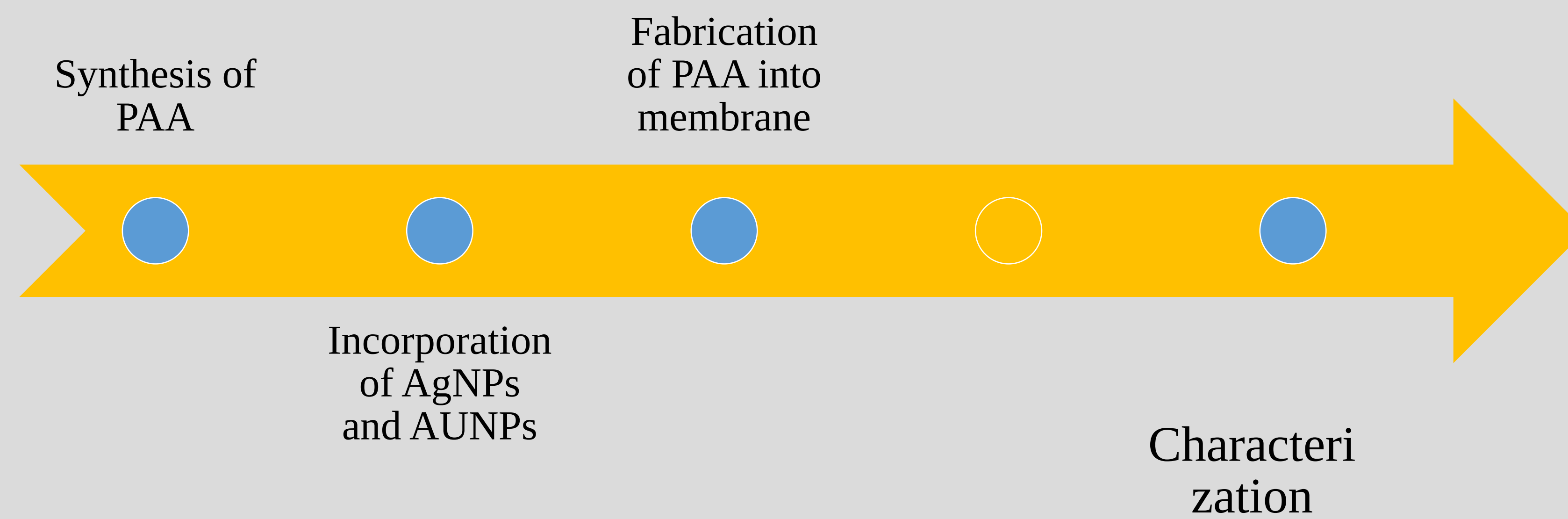
Many deaths of children below the age of five have been reported due to diseases related to contaminated water. Recently, Interventions involving the use of polymer membranes have drawn immense interest globally. Poly (amic) acid (PAA) membrane presents a novel material for use as filtration membranes in water filtration devices. The incorporation of silver and gold nanoparticles during membrane fabrication is expected to improve antimicrobial, permeability, and mechanical properties. Scanning Electron Microscopy (SEM), and UV-Visible spectroscopy were used in the characterization and the desirable properties observed qualify PAA as a candidate for use in modeling a Point of Use (POU) water filtration cartilage capable of Treating water.

## Introduction

- It is thought that POU water purification can reduce the rate of child mortality by up to 30 percent<sup>1</sup>
- Lately Polymer membranes are widely investigated for use in water recycling and reuse<sup>2,3</sup>
- The incorporation of responsive nanoparticles into the matrix of polymers should greatly enhance the permeability properties of membranes<sup>4</sup>
- In this research, Polymers of the poly (amic) acid type were synthesized under room temperature and fabricated into membranes via wet phase inversion techniques.
- We intend to use the membranes in modeling a POU water filtration cartilages capable of eliminating microbes and pesticides from water sources in Kenya.

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## Methodology



## Discussion

- The yellow viscous liquid indicated PAA formation<sup>5</sup>.
- The UV-Vis spectra in the region of 425 nm (Fig. 1 a) and 533 nm (Fig 1 b) confirmed synthesis of AgNPs and AuNPs respectively<sup>6</sup>.
- The surface and the cross section morphology of membranes ( Fig. 2a) and (Fig. 2b) were smooth and porous Indicating good permeability<sup>7</sup>.
- High Density spherical AgNPs and AuNPs were well dispersed and embedded in and on the membrane in both cases with reduced agglomeration. Indicating desirable ability Of PAA to form and stabilize NPs<sup>8</sup>.

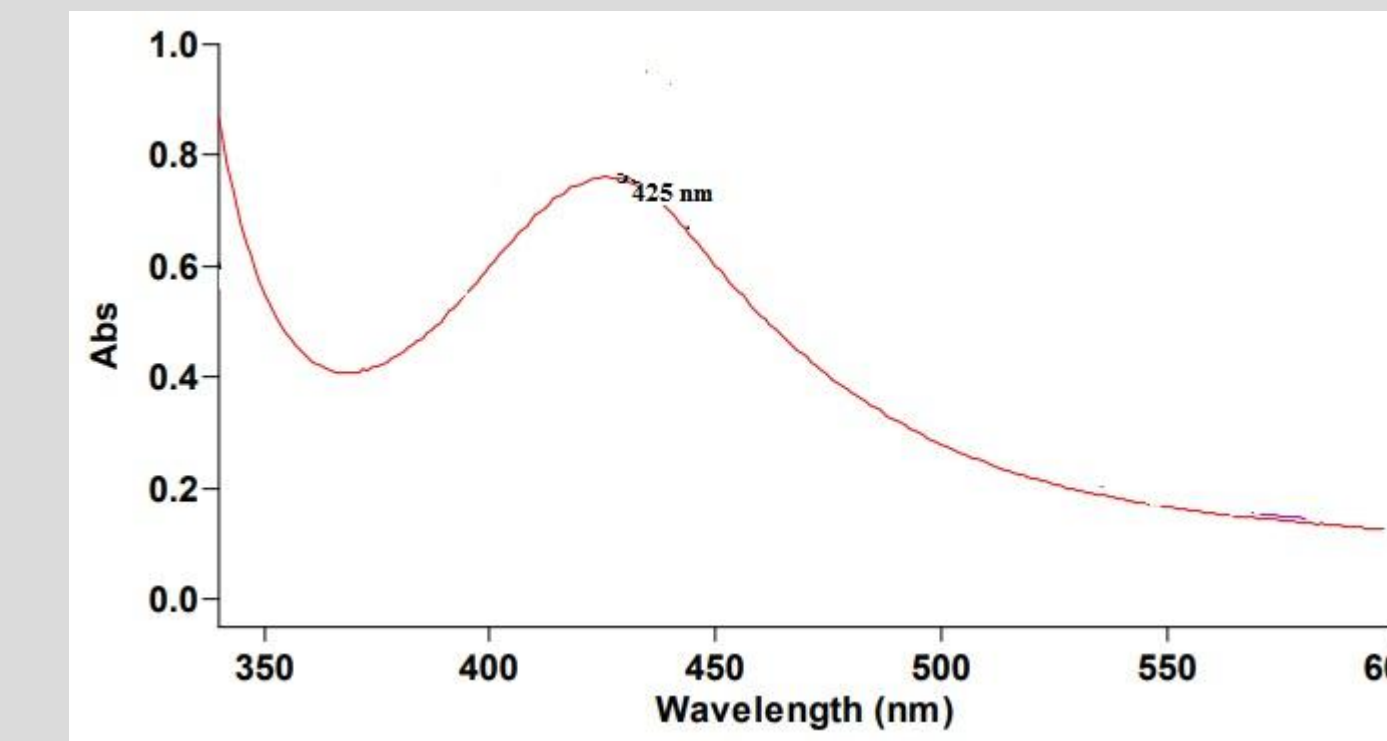


Figure 1a. UV/Vis for AgNPs

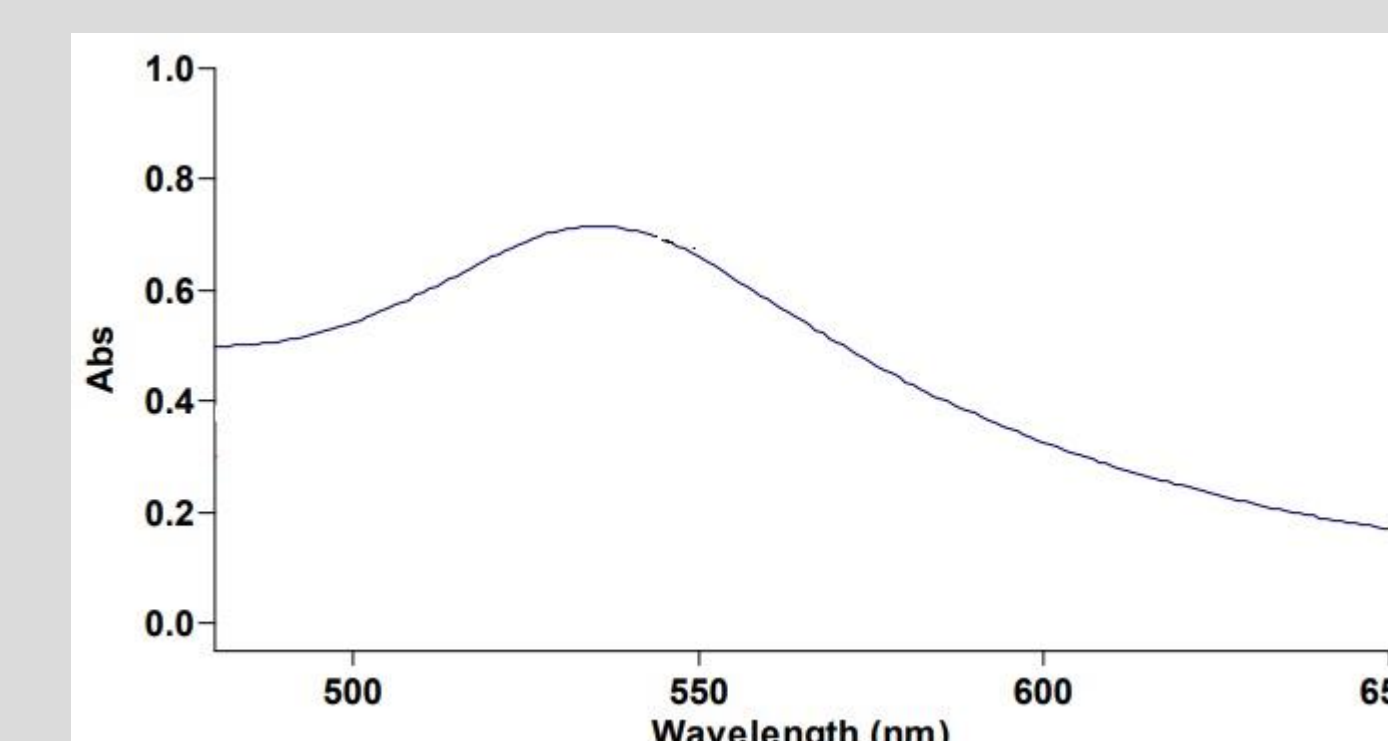


Figure1 b. UV/Vis for AuNPs

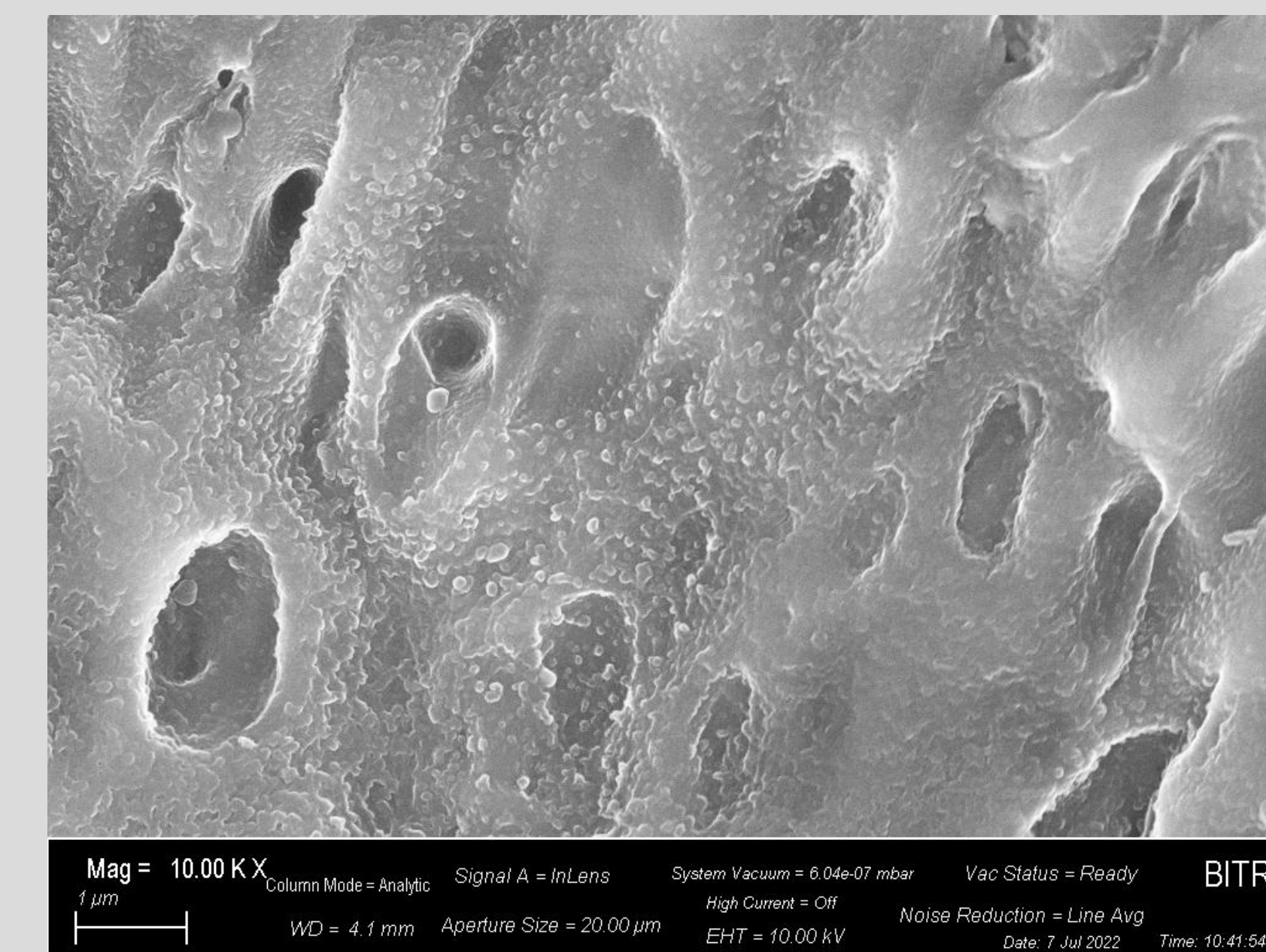


Figure 2a side SEM image (10KX)

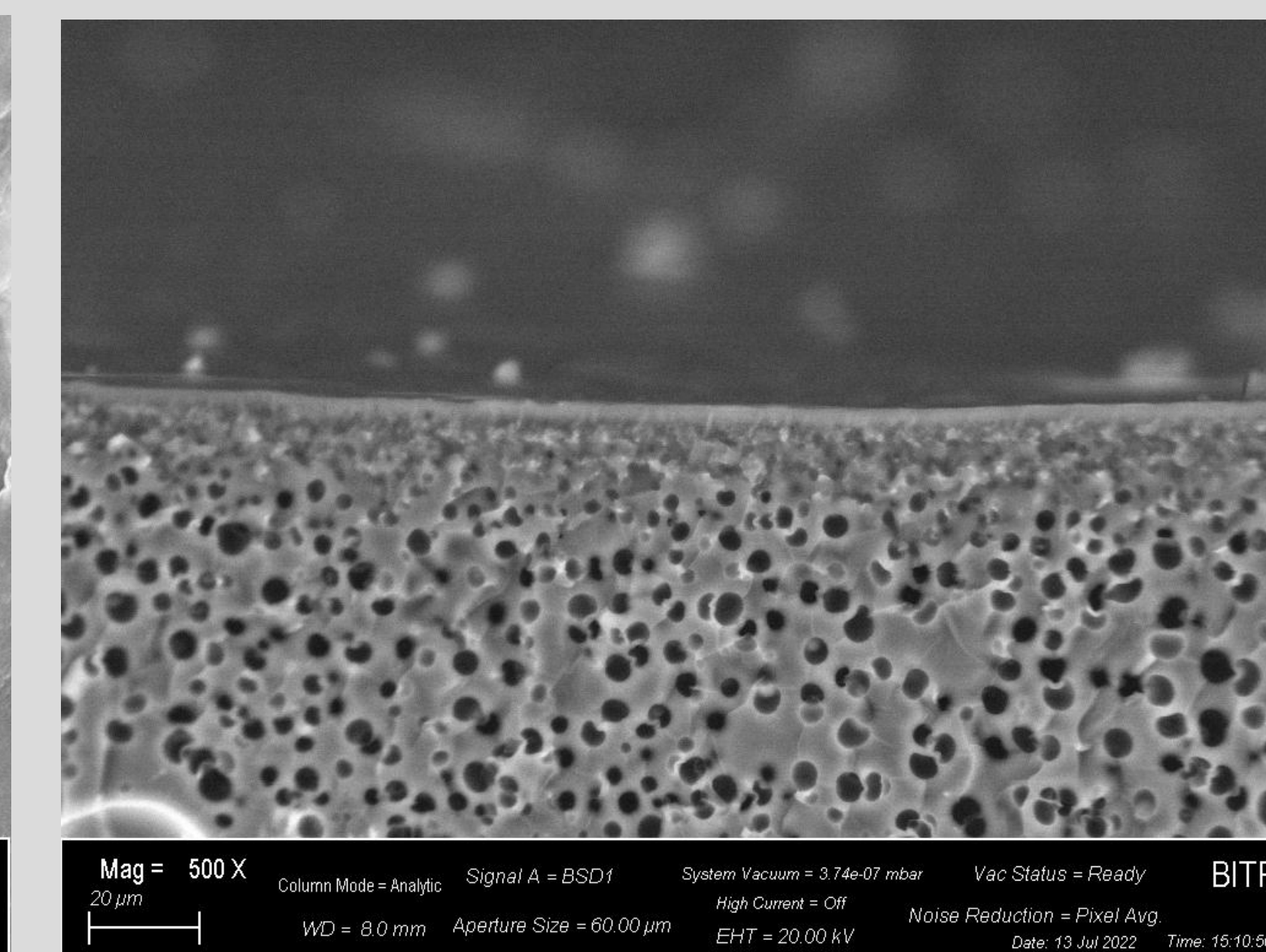


Figure2 b. Cross section SEM image (500x)

## Conclusion

- AgNPs and AuNPs were successfully synthesized and stabilized in the PAA membrane at room temperature.**
- Porous membranes formed via wet phase inversion at room temperature**
- Nanoparticles were successfully embedded within the matrix of the PAA membrane**

## References

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