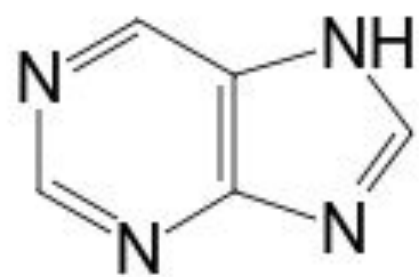
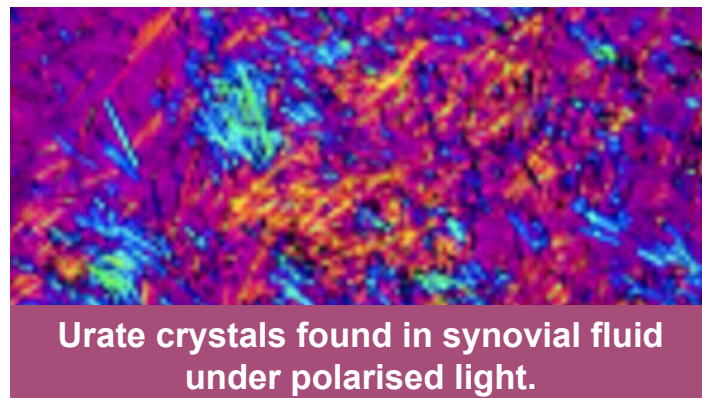


Introduction

Gout, a common form of arthritis, causes needle-like urate crystals to form in the patient's synovial fluid as a result of elevated uric acid levels, caused by the consumption of foods with high levels of purines, the kidney's inability to sufficiently eliminate uric acid, or the increased production of uric acid by the patient's body.



Purine



Urate crystals found in synovial fluid under polarised light.

Treatments for Gout include tracking uric acid levels when undergoing urate-lowering therapy, taking urate-lowering medications, and altering food habits/lifestyle (low-purine diet). Monthly blood tests are used to regularly check if uric acid levels are low enough to prevent flares/episodes.

Motivation and Impact

Blood tests, the common test that detects high levels of uric acid ($400 \mu\text{M}$)

Current Limitation: **Proposed approach:**

Time Consuming

Fast response

Expensive

Affordable

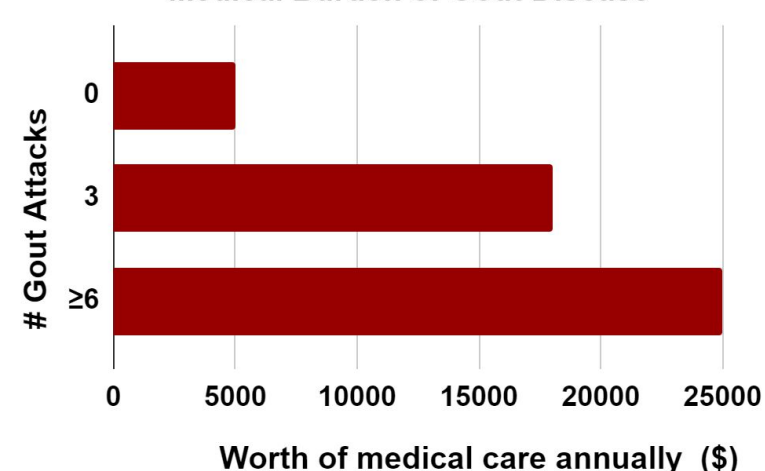
Invasive

Non-invasive

Specialized management

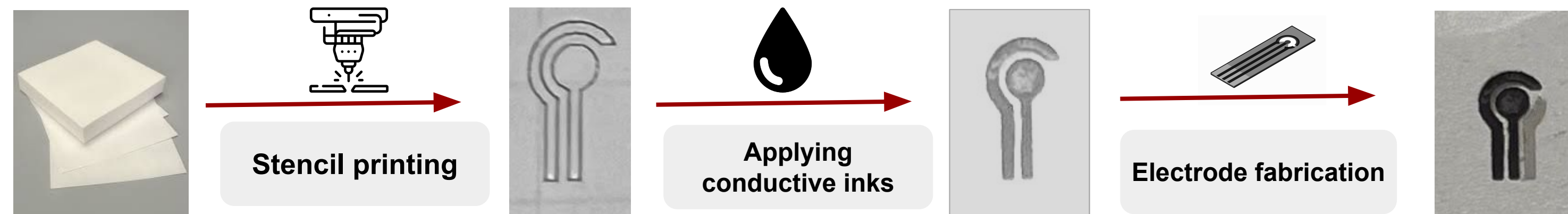
User friendly

Medical Burden of Gout Disease

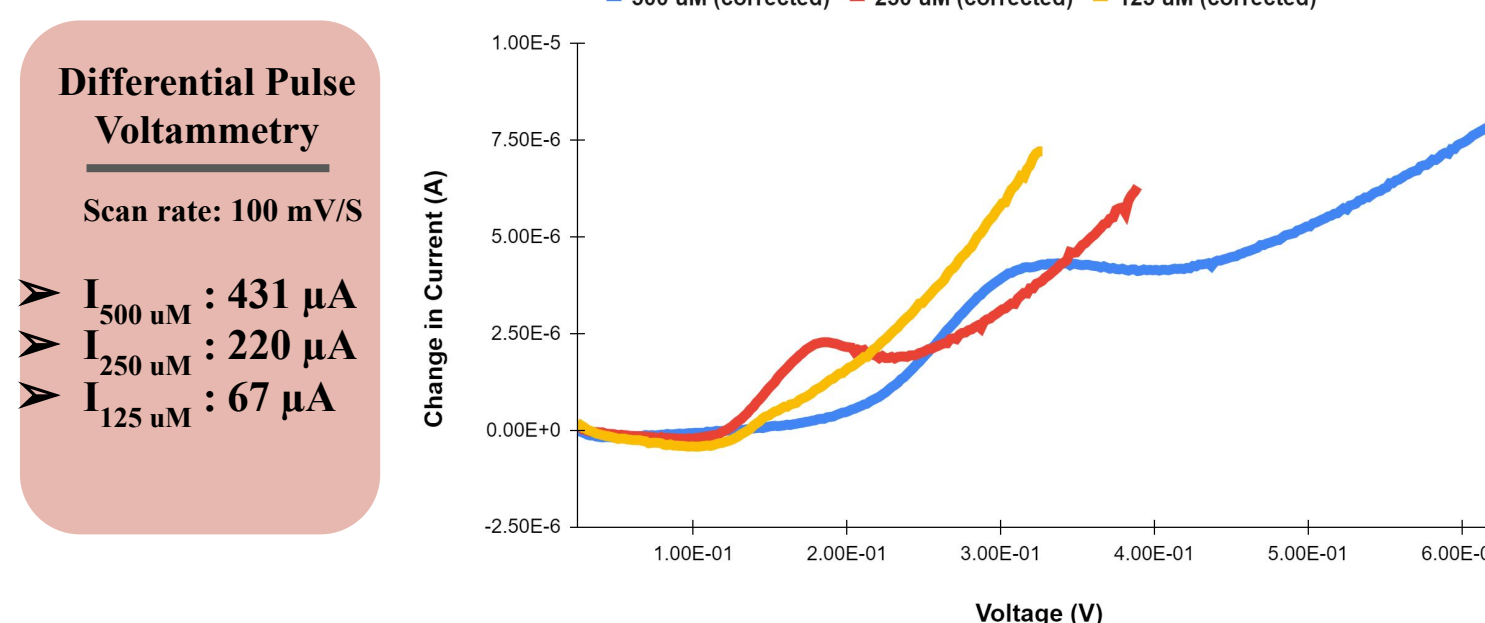
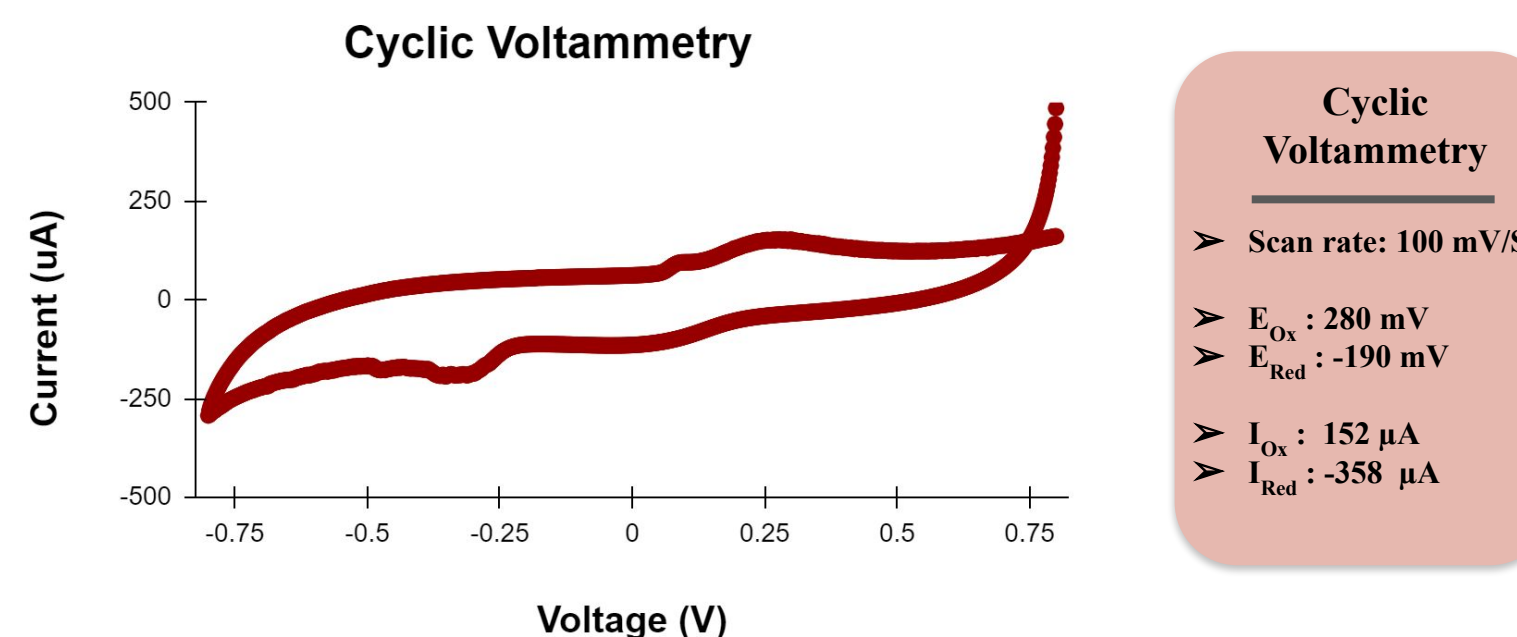


The incorporation of a paper-based technology would significantly enhance uric acid level monitoring in the patient's perspiration or other bodily excretions while being affordable and timely.

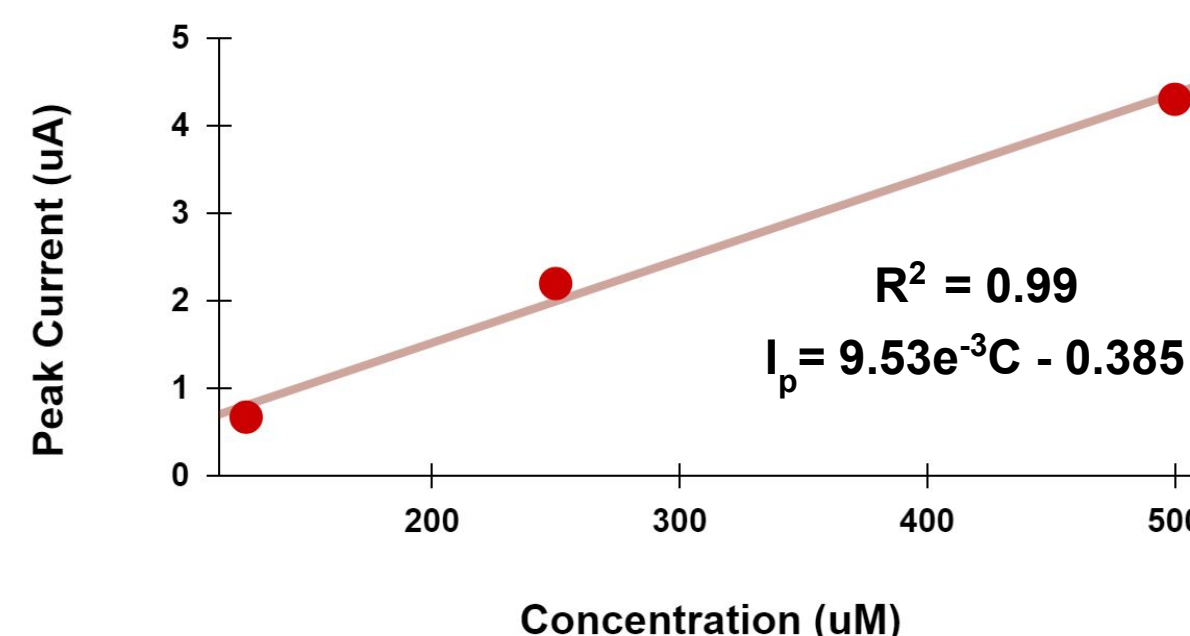
Methods



Results



Calibration



Conclusion

- Fabricated paper-based electrode successfully detect UA in the therapeutic range
- CV and DPV shows accurate detection of uric acid concentration in phosphate buffer solution

Future Work

- Improve detection limit to develop point-of-care prevention device for of uric acid build up.
- Develop compact, portable readout system for daily-use



SHINE Impact

USC's SHINE Program allowed me to explore biomedical engineering and emphasize my concrete passion for research by surrounding me with people in STEM and giving me the encouragement and resources I don't have.

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