

Sustainable non-enzymatic glucose sensors from residual biomass-derived carbon materials

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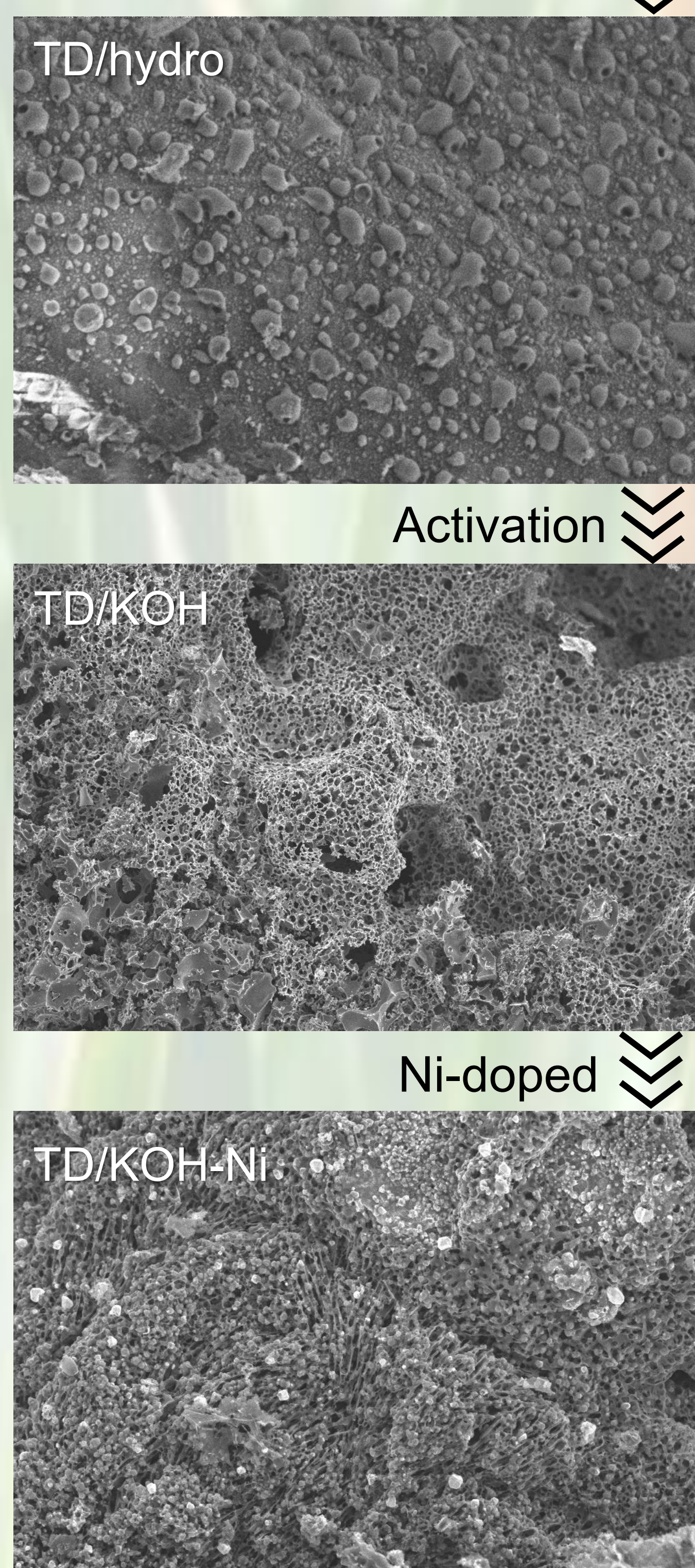
Introduction

Diabetes continues to rise globally, increasing the demand for stable and low-cost glucose sensors. Non-enzymatic Ni-based systems overcome the limitations of enzymatic sensors, the high cost of noble metals, and the reliance on fossil-fuel-derived carbons. Biomass materials from *Typha domingensis* (TD), *Cladium mariscus* (CM) and *Phragmites australis* (PA), selected for their abundance and invasive nature in wetlands, were collected from Tablas de Daimiel National Park (Spain). These biomass precursors were converted into porous Ni-doped carbon materials through hydrothermal carbonization, chemical and thermal activation (600 °C), and evaluated as non-enzymatic glucose sensors.

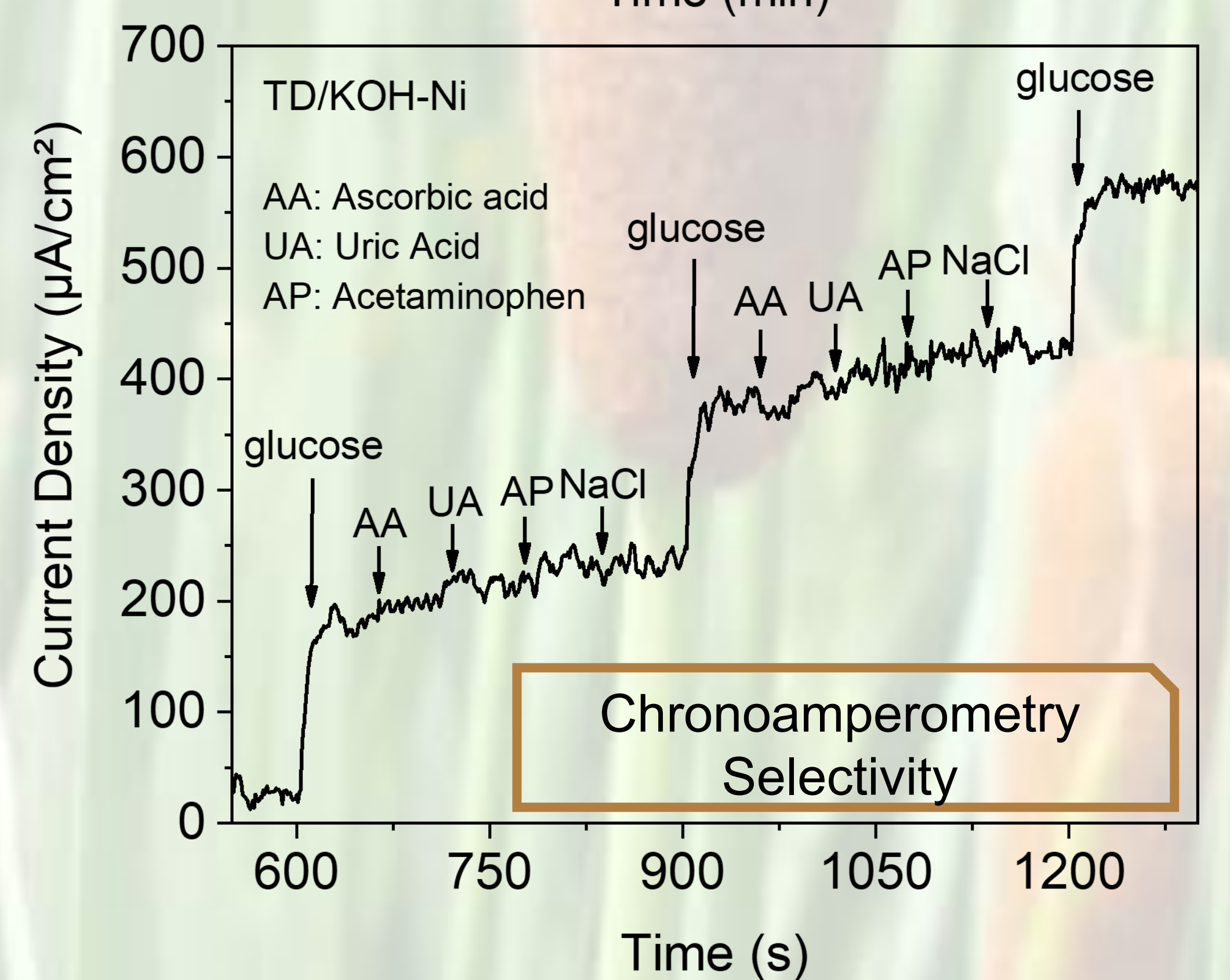
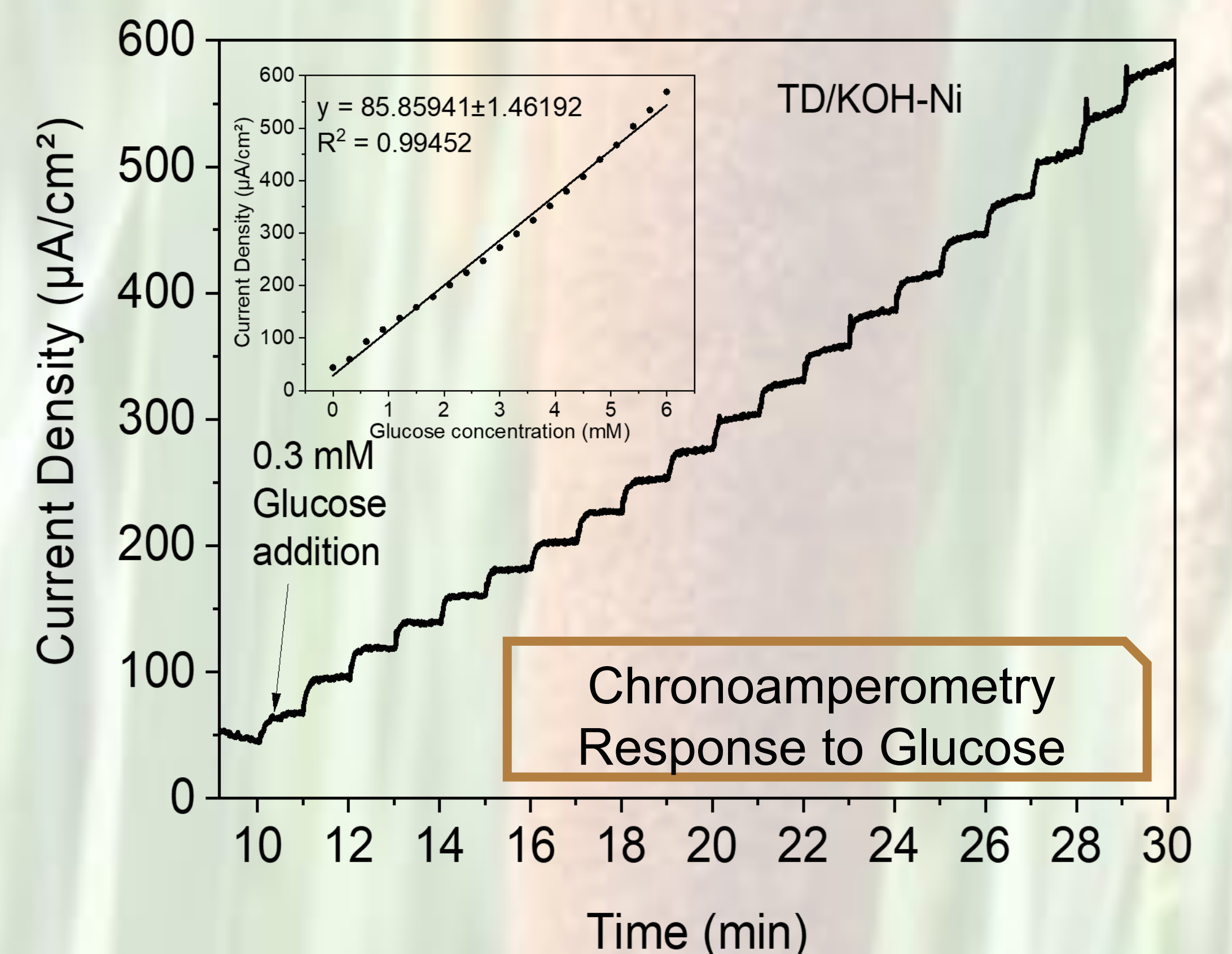
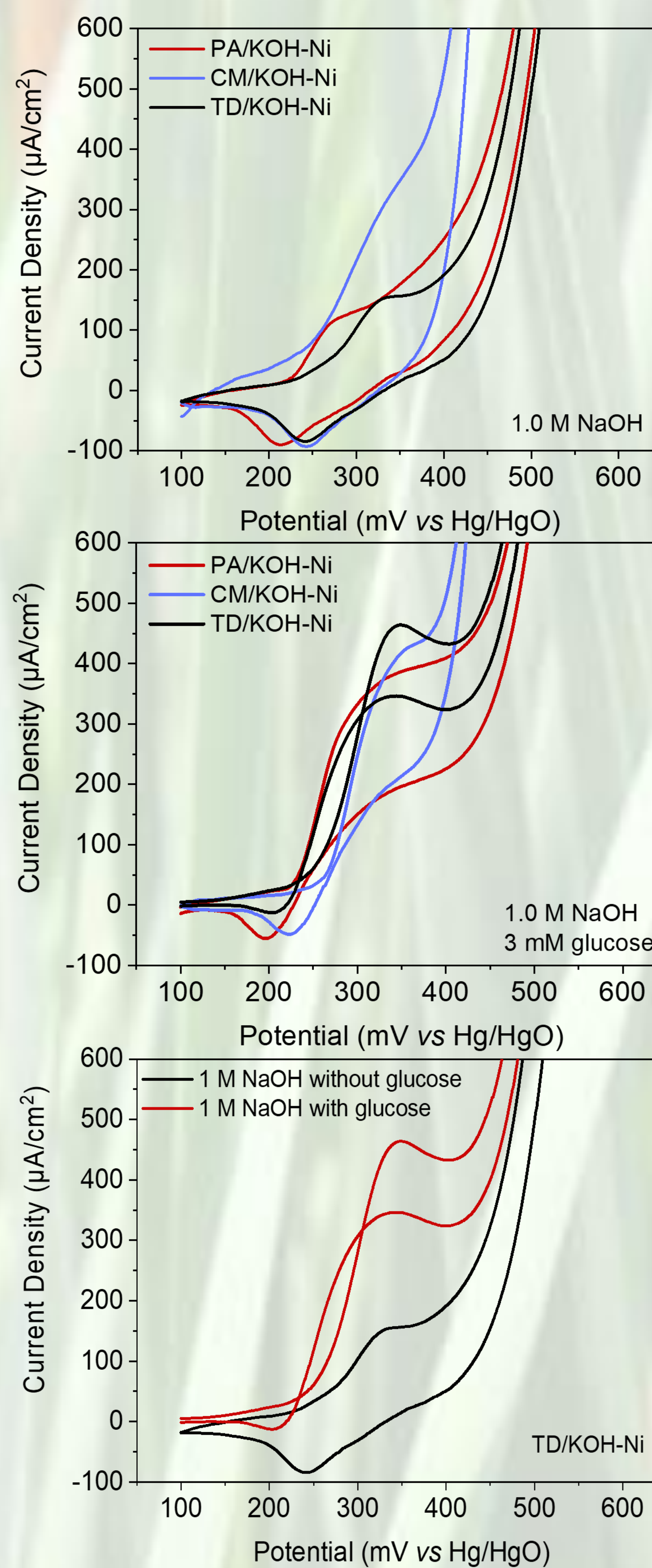
Experimental method



Results



Cyclic Voltammetry



Conclusions

- Non-enzymatic glucose sensors were successfully developed from invasive wetland biomass (TD, CM, PA).
- The TD/KOH-Ni sensor showed high sensitivity ($85.86 \mu\text{A cm}^{-2} \text{mM}^{-1}$), low LOD ($45.13 \mu\text{M}$), wide linear range (up to 6 mM), and strong selectivity.
- This work demonstrates a cost-effective and sustainable strategy to obtain high-performance glucose sensors by valorizing residual biomass.

Acknowledgments

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