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利用奈米碳材料結合奈米金屬應用於生物感測器與綠色能源技術 Development of Carbon nano material with Nano metal and its application for biosensor and green energy

國立台北科技大學 化學工程所 博士班五年級 楊政祐
指導教授：陳生明 博士

研究重點

Novel platinum and silver decorated multi-walled carbon nanotubes (PtAg/MWCNTs) have been successfully prepared on electrode surface for nonenzymatic glucose detection. In neutral condition, the electrode shows good activity towards glucose oxidation with low overpotential (-0.35 V vs. Ag/AgCl) and a current response that is 2.5–20 times greater than that obtained using Pt/MWCNTs/GCE and Ag/MWCNT/GCE. Voltammograms indicate a linear range of 1–25 mM with sensitivity of $115.8 \mu\text{A mM}^{-1} \text{cm}^{-2}$. This electrode can effectively analyse glucose concentration in bovine serum albumin samples. It shows advantages with low overpotential, high sensitivity, good stability, and low cost. The PtAg/MWCNTs/GCE glucose biosensor combine the Au/MWCNT/GCE oxygen sensor and its application for biofuel cell with sensitivity of $281.86 \mu\text{A mM}^{-1} \text{cm}^{-2}$ and $205.73 \mu\text{A L mg}^{-1} \text{cm}^{-2}$, respectively.

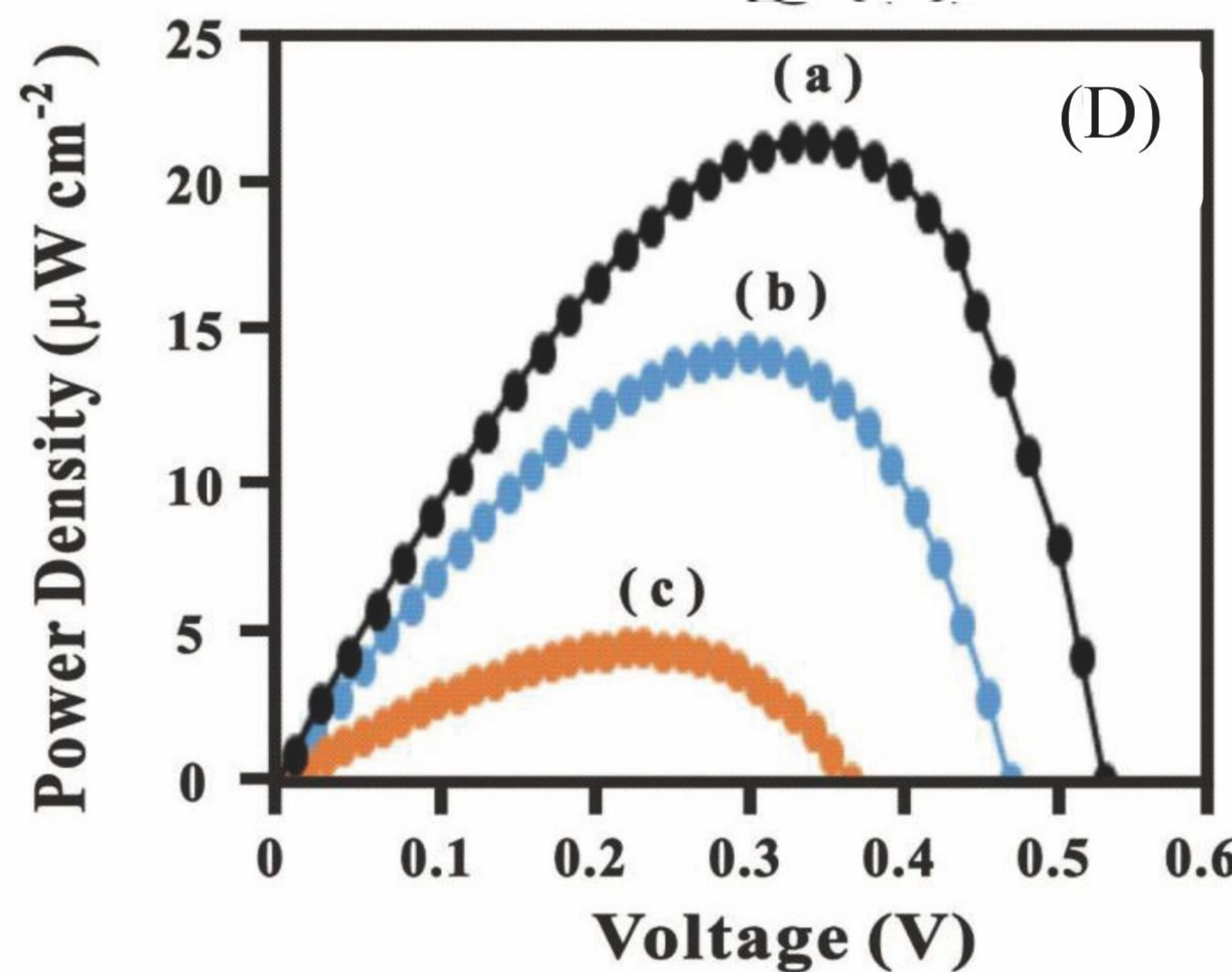
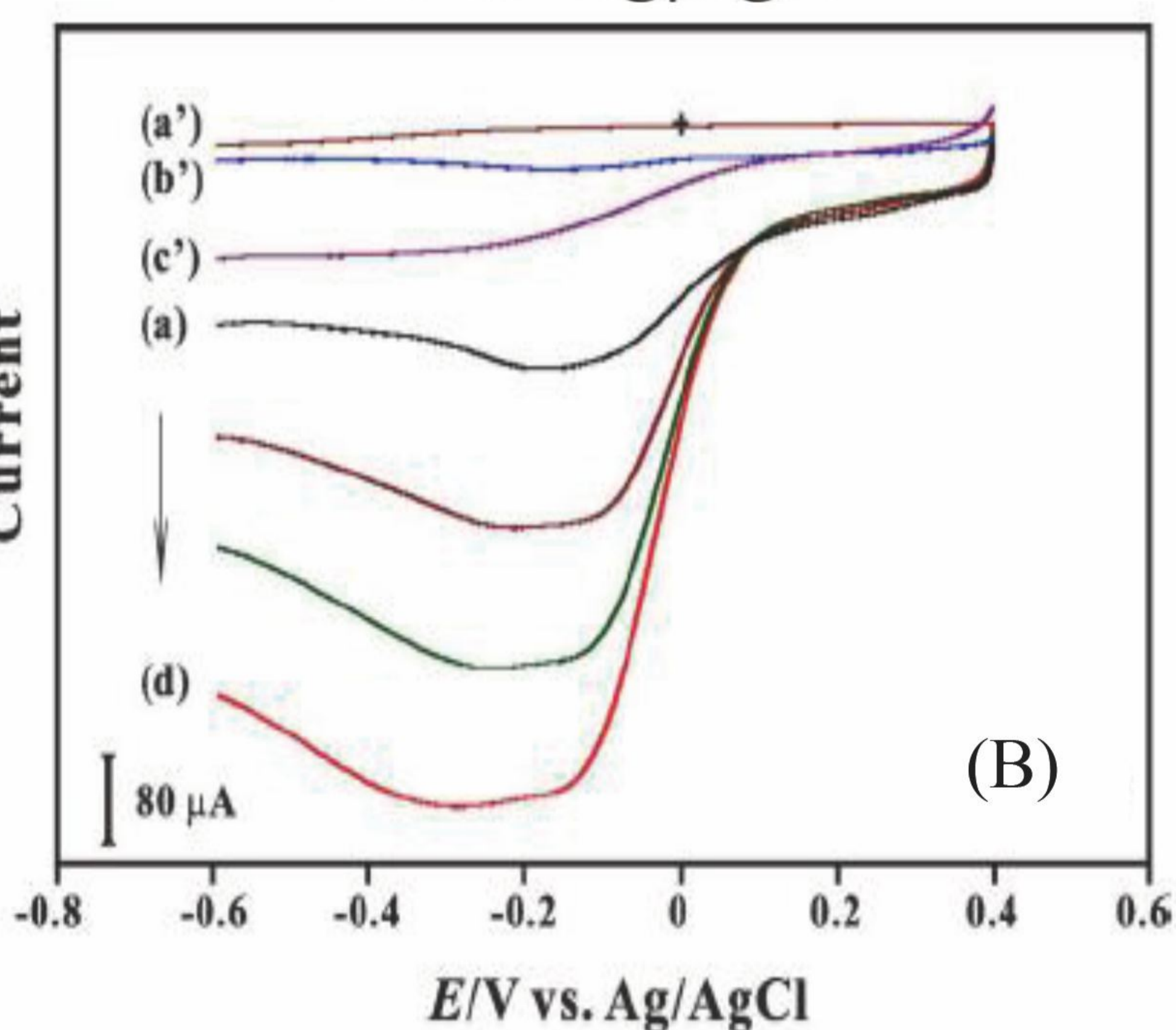
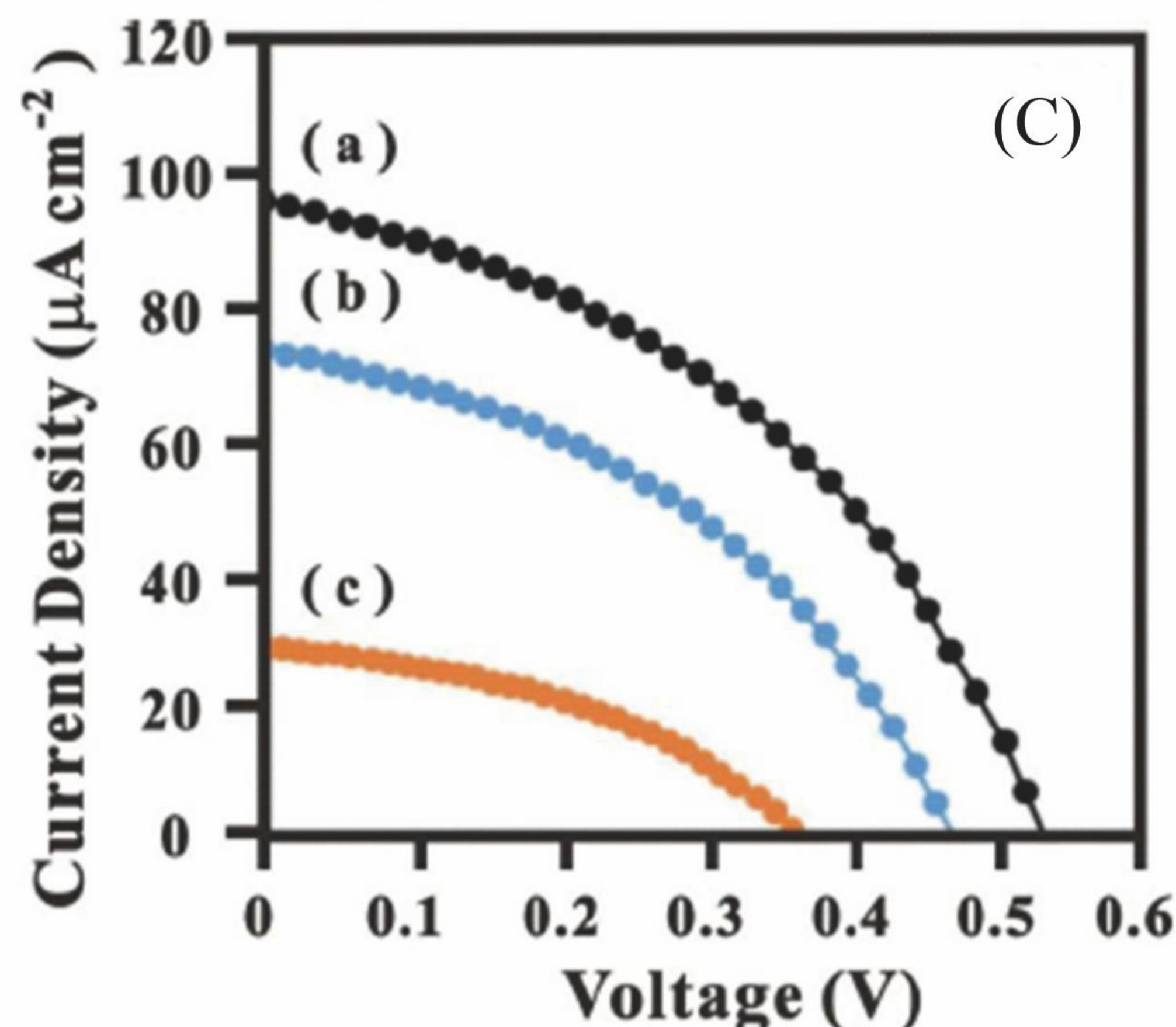
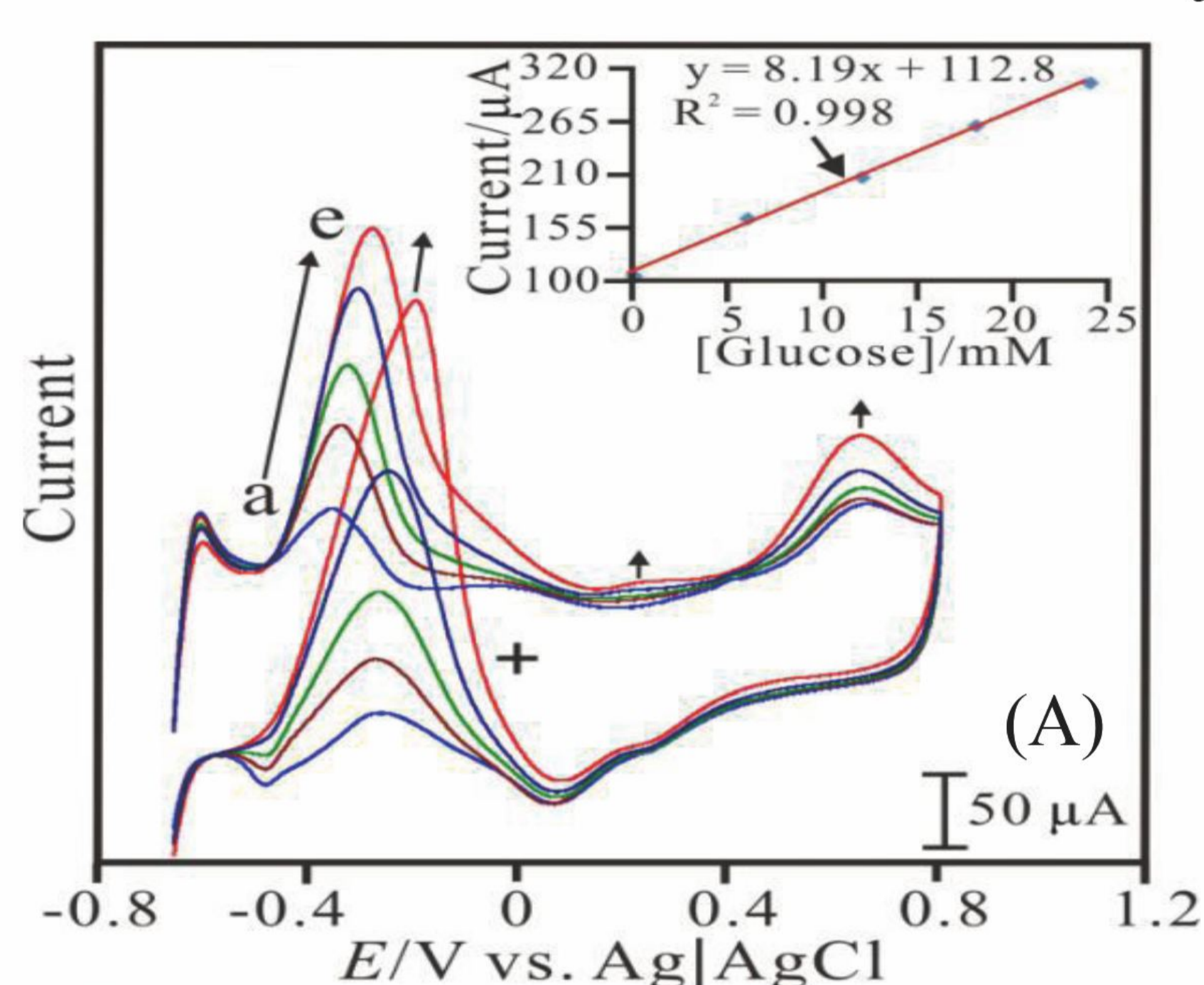


Fig. (A) Cyclic voltammograms of PtAg/MWCNTs/GCE examined in pH 7 PBS containing glucose (a) 0 to (e) 18 mM. Fig. (B) LSVs of Au/MECNT/GCE in 0.05 M pH 7 PBS containing dissolved oxygen (a) 0 to (d) 30 mg/L. (a') bare GCE, (b') Au/GCE and (c') f-CNT/GCE are in the same PBS containing 30 mg/L dissolved oxygen.

Fig. (C) Polarization curves of biofuel cell based on (a) Au/MWCNT, (b) Au and (c) MWCNT biocathode. And the (D) dependence of the power density on the cell voltage for biofuel cell. The condition is same as (C).

研究生活及心得

博士班的過程是艱辛的，研究的路上遭遇到許多的挫折，幸好我的指導教授以及親愛的家人能夠及時給我鼓勵使我有動力能夠繼續堅持下去，也再次感謝中技社的協助與肯定我的研究成果，未來我將持續努力，期盼能為台灣未來的研發能量奉獻一己之力。