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# Supplemental Information

# Enhanced Electrochemical Biosensor and Supercapacitor with 3D Porous Architectured Graphene via Salt Impregnated Inkjet Maskless Lithography

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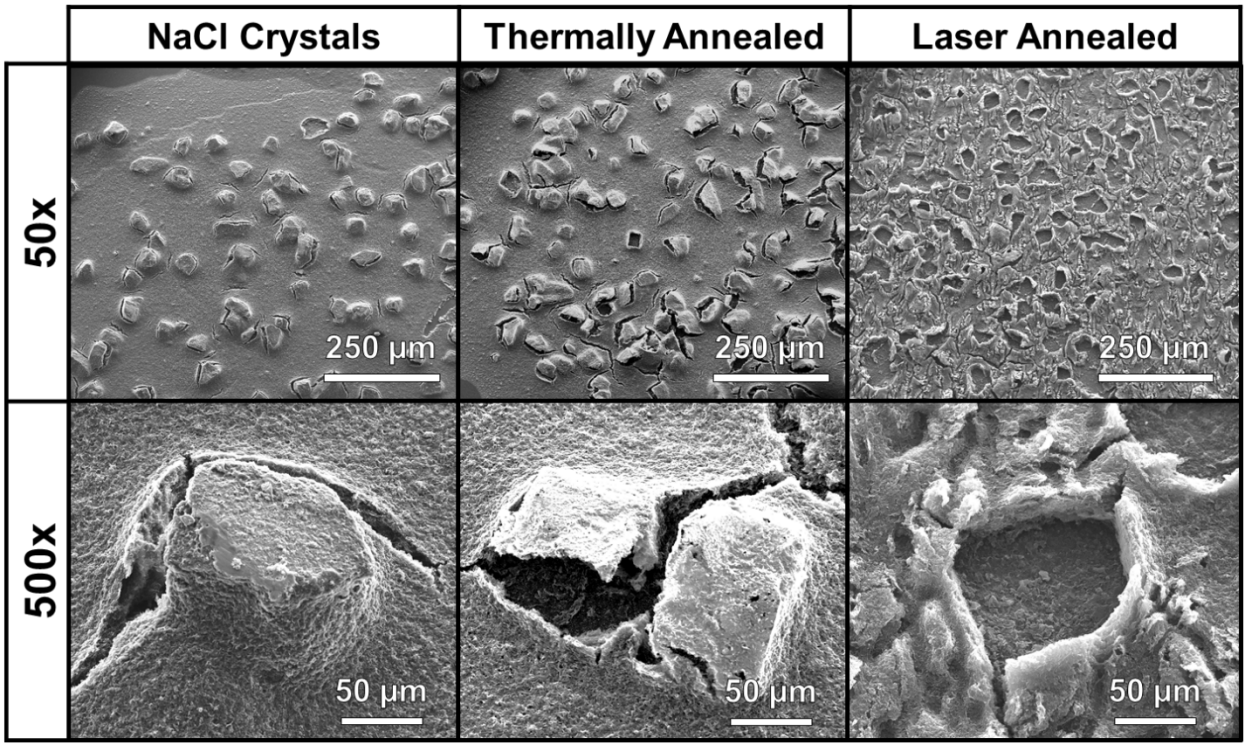


**Figure S1.** SEM of Salt impregnated pores into spin coated graphene ink: **Left:** Before laser annealing showing salt in completely coated in graphene flakes. **Center:** After thermal annealing and rinsing showing salt has been removed but pore is not opened. **Left:** After laser annealing showing etching of surface opening the pore into the surface of the graphene.

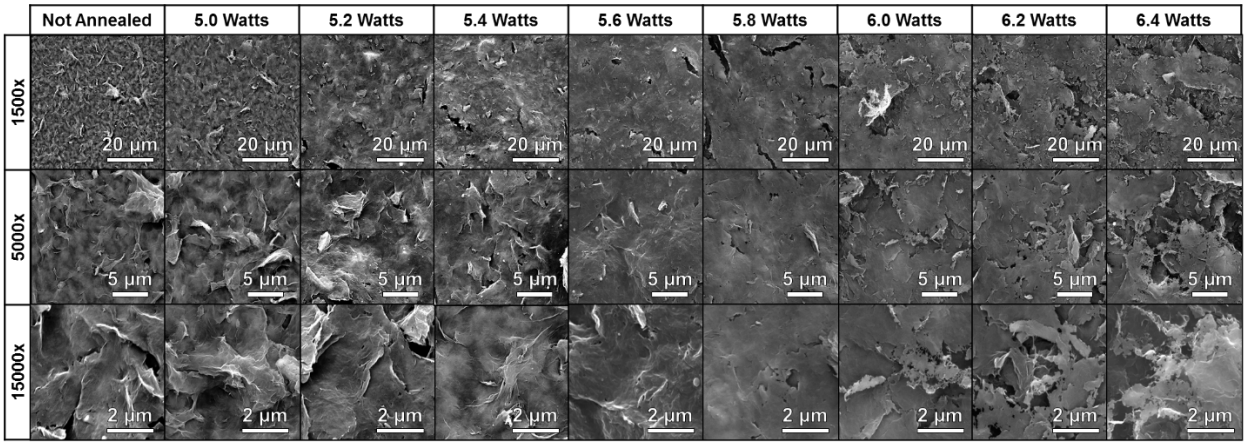


**Figure S2.** SEM of graphene surface with increasing laser annealing powers (5 W to 6.4 W, raster rate fixed at 350 mm/s) and various magnifications (1500x, 5000x, and 15000x). From not annealed to 5.8 W, graphene flakes are smoothed and welded together and from 5.8 W to 6.4 W, $CO_2$ laser begins to etch through the surface making microsized pores

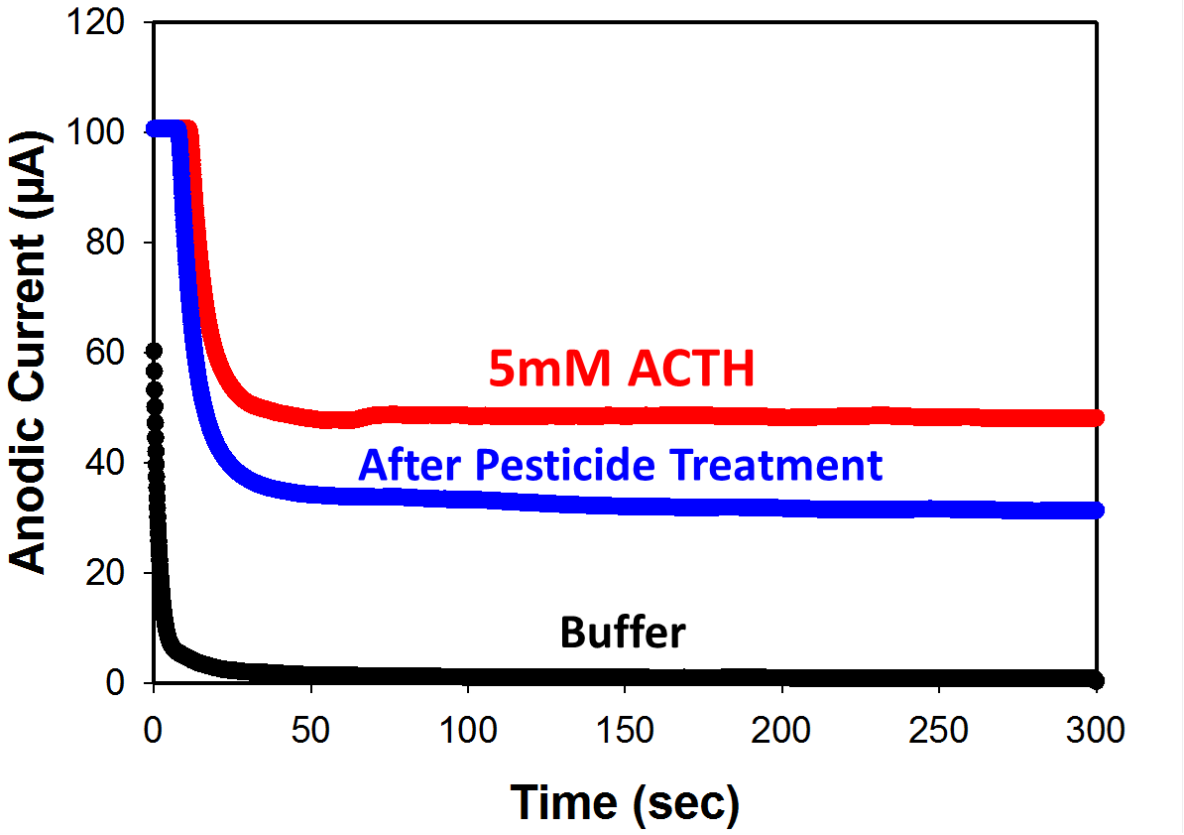


**Figure S3.** Representative amperometric graph depicting basic ACHE biosensor data extraction.

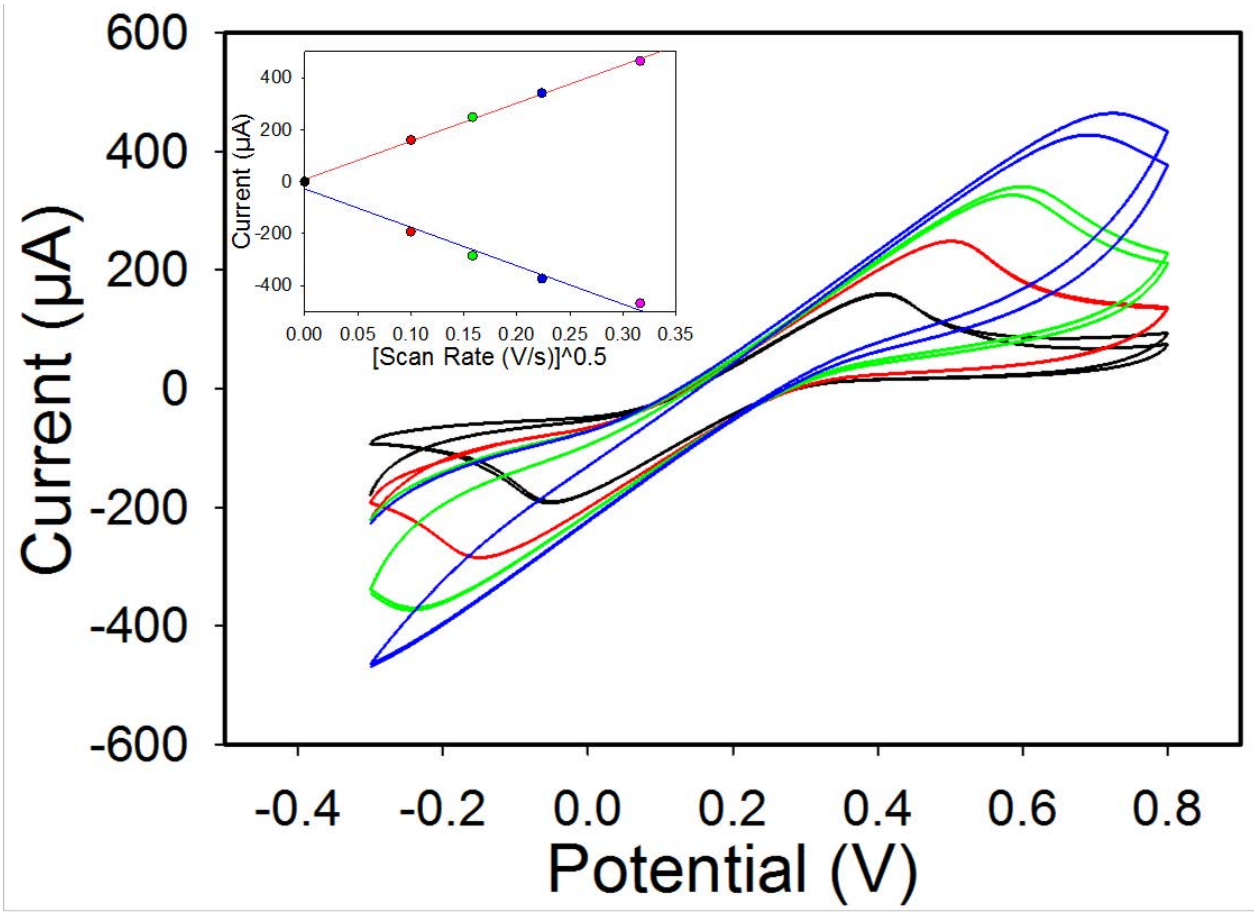


**Figure S4.** Representative cyclic voltammetry of SIIML graphene electrodes in 5 mM ferro/ferricyanide with various scan rates (5-50 mV/s). **Inset**: Randles-Sevcik plot: anodic and cathodic currents *vs.* with square root of scan rate.

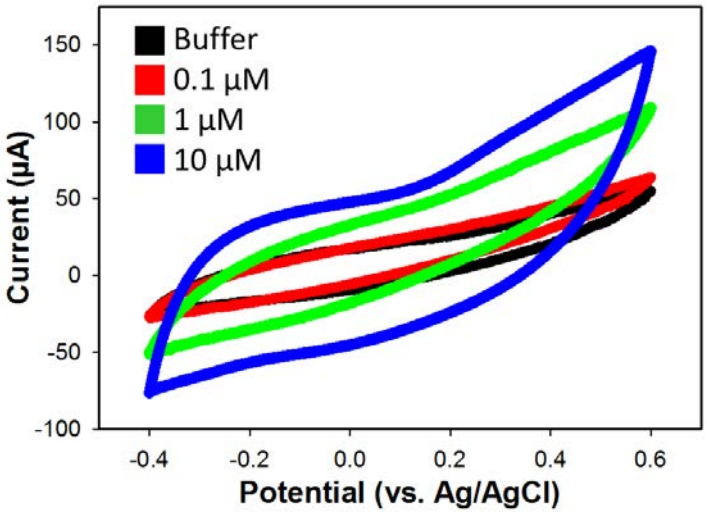


**Figure S5.** Cyclical voltammetry showing increase in ACTH concentration

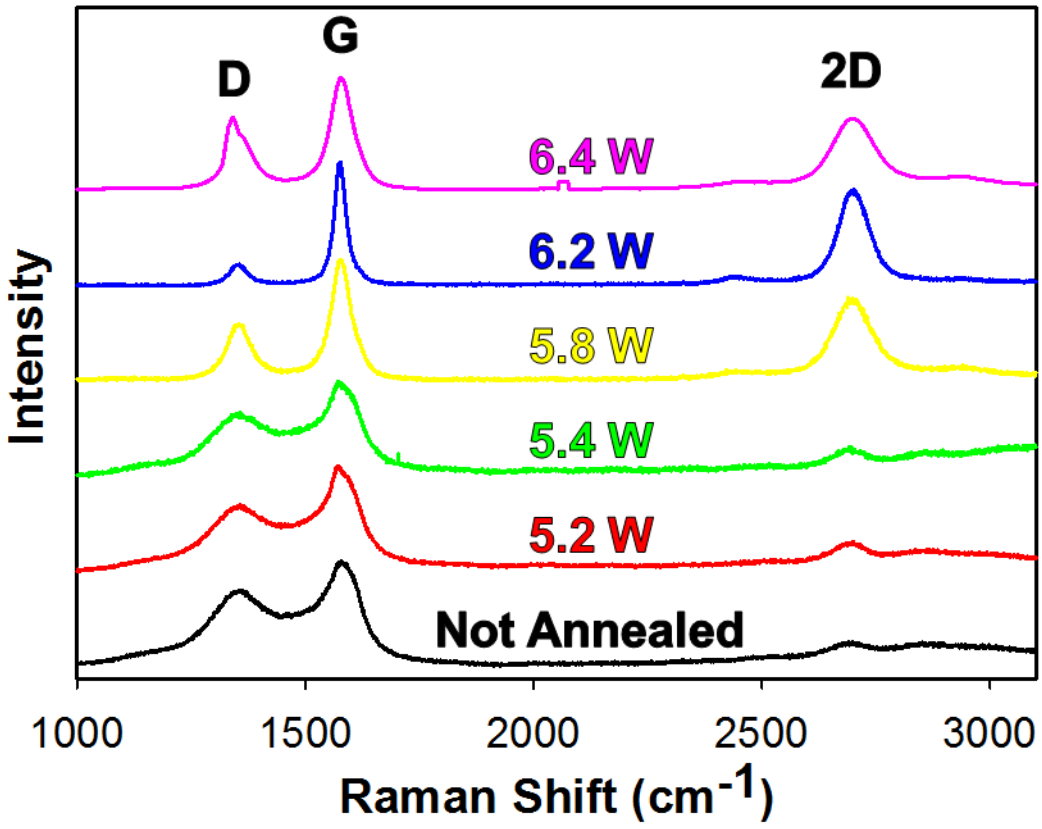


**Figure S6.** Raman spectra of not annealed graphene and increasing $CO_2$ laser powers.

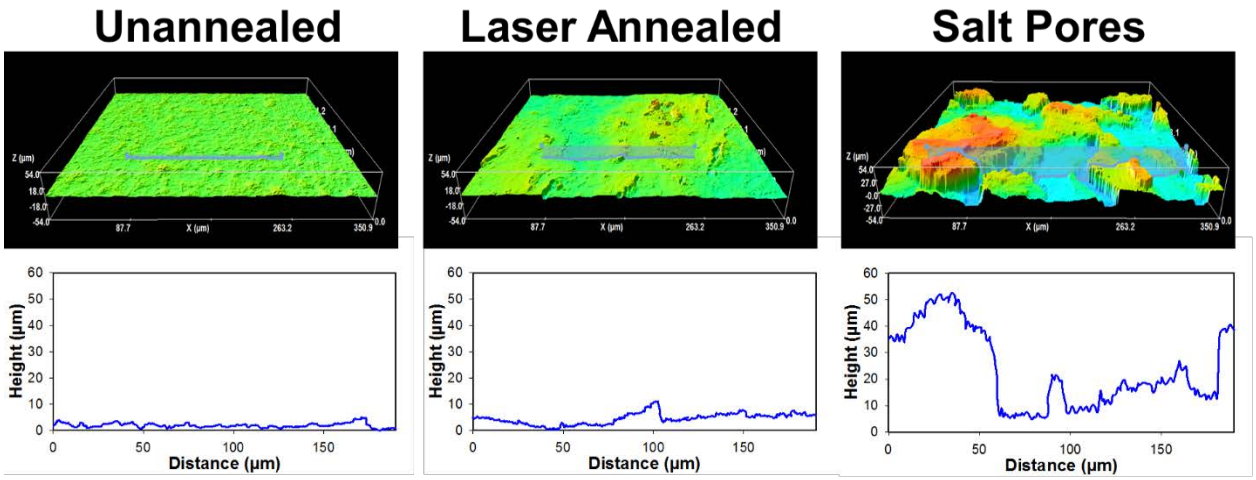


**Figure S7.** Confocal microscopy photos of not annealed graphene, laser annealed graphene, and macroporous SIIML graphene along with corresponding surface profiles.

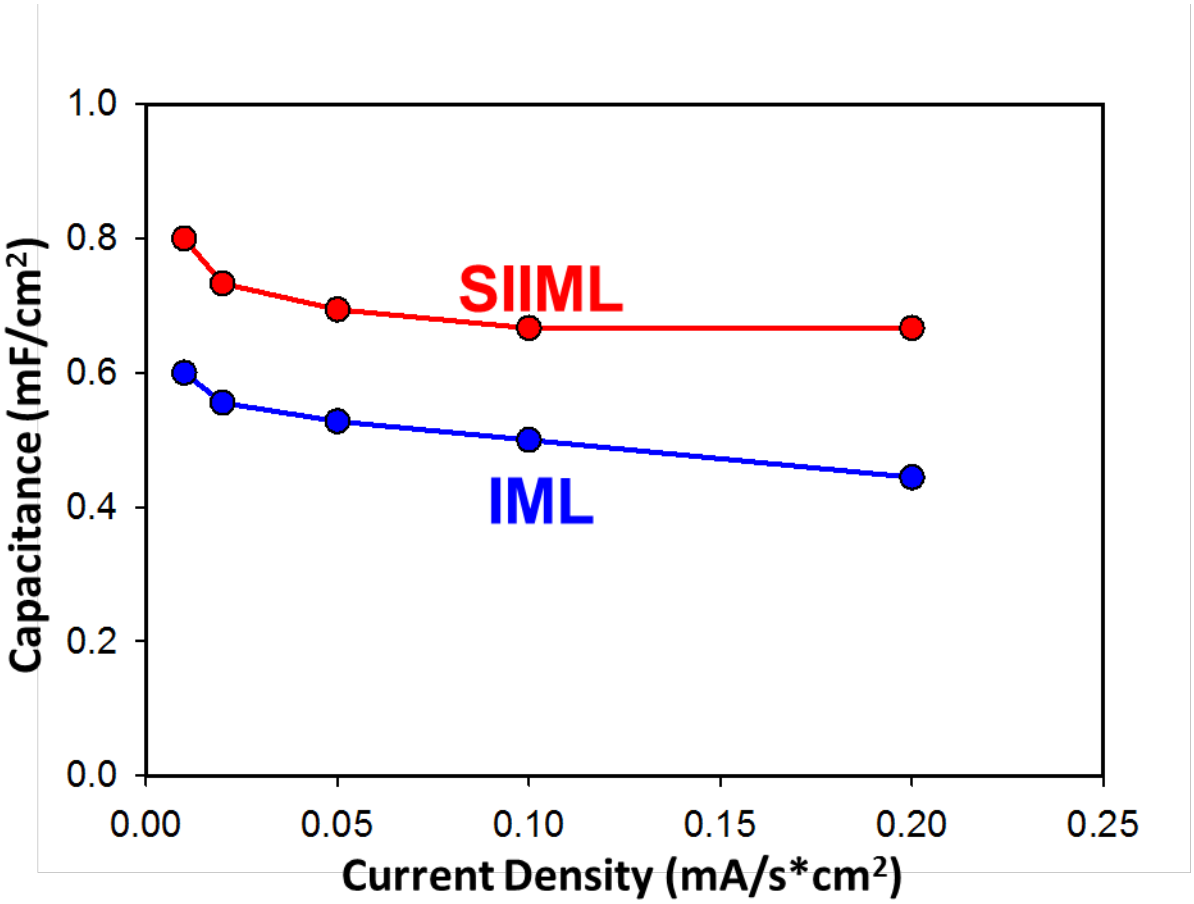


**Figure S8.** Calculated capacitance of supercapacitors from galvanostatic discharge of SIIML and IML (without salt) of supercapacitor devices

**Movie S1:** Patterning of Salt Impregnated Inkjet Maskless Lithography (SIIML) electrodes, sacrificial layer removal via acetone impingement revealing high resolution electrochemical electrodes.

**Movie S2:** SIIML graphene electrodes after IML process showing salt completely covered with graphene, laser annealing which etches surface revealing salt crystals, and washing which removes salt crystals opening macroscale pores in the surface of the graphene

**Movie S3:** SIIML patterned graphene supercapacitor array powering red LED.