Electronic Supporting Information (ESI)

Proteinase-Sculptured 3D-Printed Graphene/Polylactic Acid Electrodes as Potential Biosensing Platform: Towards Enzymatic Modeling of 3D-Printed Structures

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Contents

Table S1. Comparison of electrochemical naphthol detection methods in terms of electrode materials, limit of detection and linear ranges.

Electrode	Analyte	Limit of detection	Linear range	Ref.
High-index facet SnO_2 modified glassy carbon	1-naphthol	5 nM	20–400 nM	1
Tosflex polymer modified glassy carbon electrode	2-naphthol	0.2 µM	0.8–10 µM	2
Boron-doped diamond	2-naphthol	Not reported	0.125–1 mM	3
3D-printed graphene/polylactic acid	1-naphthol	< 3 µM	3–96 µM	This work

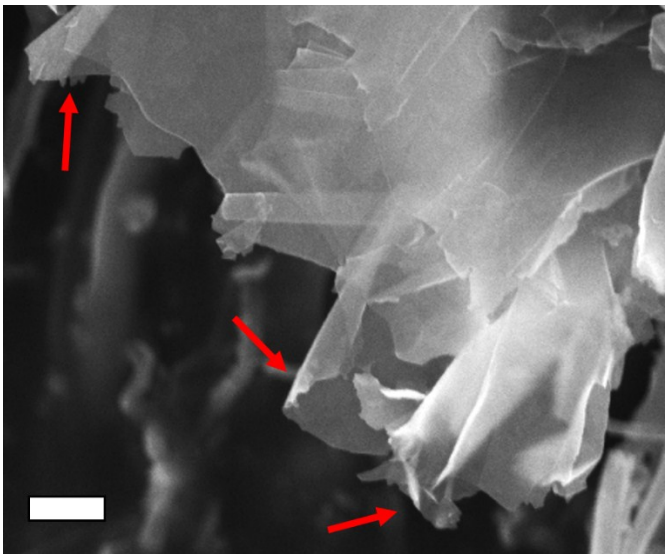

Figure S1. SEM image showing a close look on an exposed graphene sheet after proteinase K treatment of a 3D-printed electrode. The red arrows show the wrinkled features of graphene. Scale bar: 200 nm.

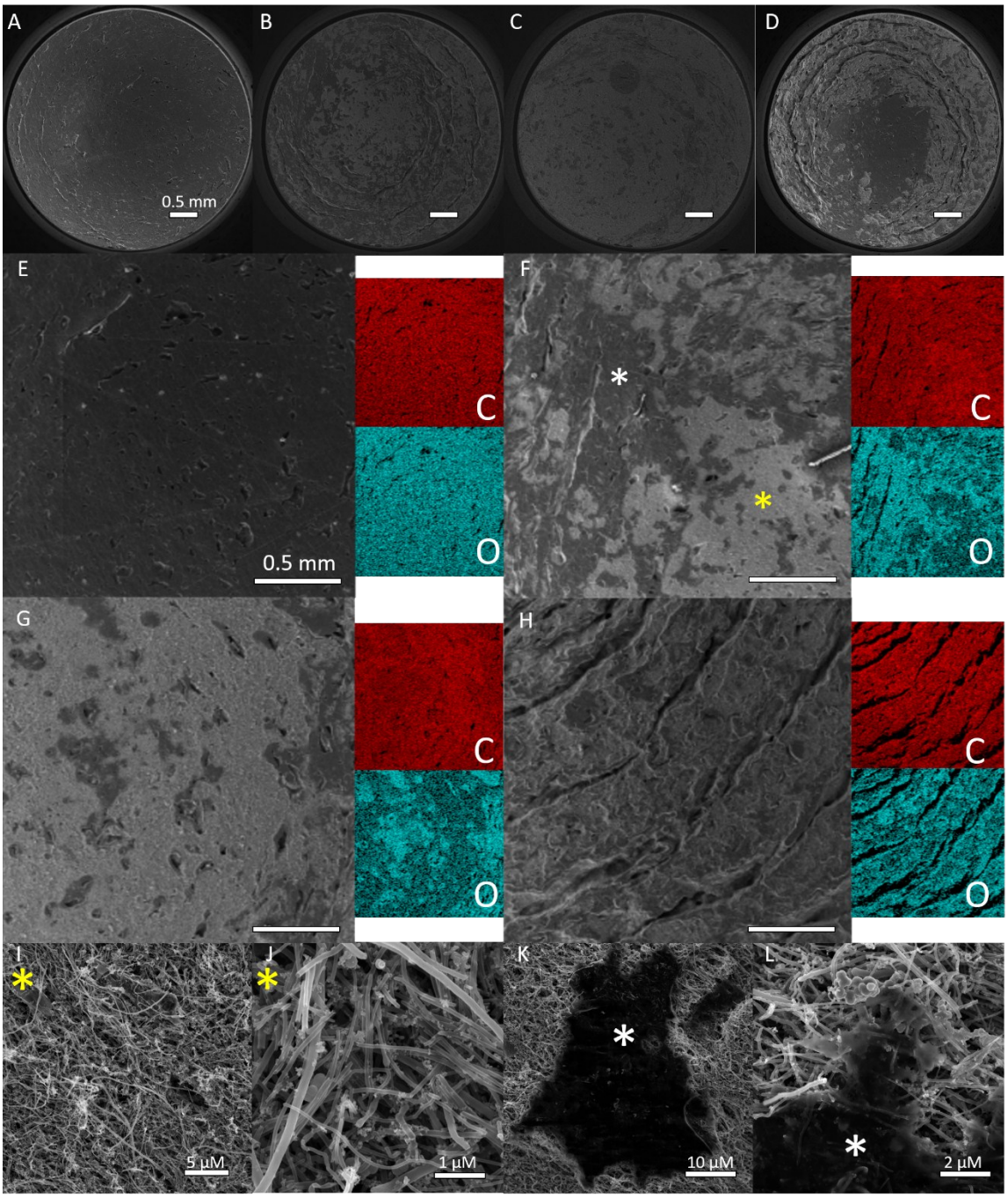

Figure S2. SEM/EDS images at different digestion times: A-D) low-magnification images of as-printed electrodes and digested surfaces after 3, 6 and 28 h, respectively; E-H) SEM/EDS mapping showing carbon and oxygen distribution of as-printed electrodes and digested surfaces after 3, 6 and 28 h, respectively. White and yellow asterisks in F represent the PLA-covered and exposed parts of the electrodes after 3 h of activation, respectively. I and J) detailed morphologies of conductive parts of the electrodes exposed after 3 h of digestion and K and L) PLA-rich (not-digested) boundary regions after 3 h of digestion.

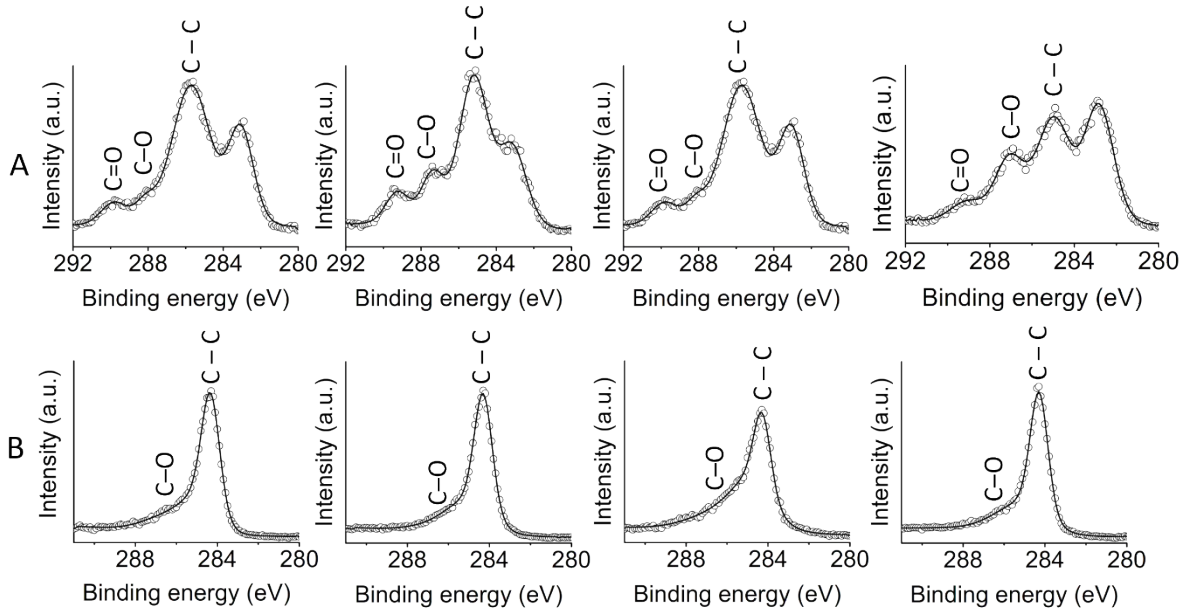

Figure S3. XPS high-resolution spectra of C 1s regions taken at four different spots at the surface of: A) as-printed electrodes and B) proteinase-K-treated electrodes.

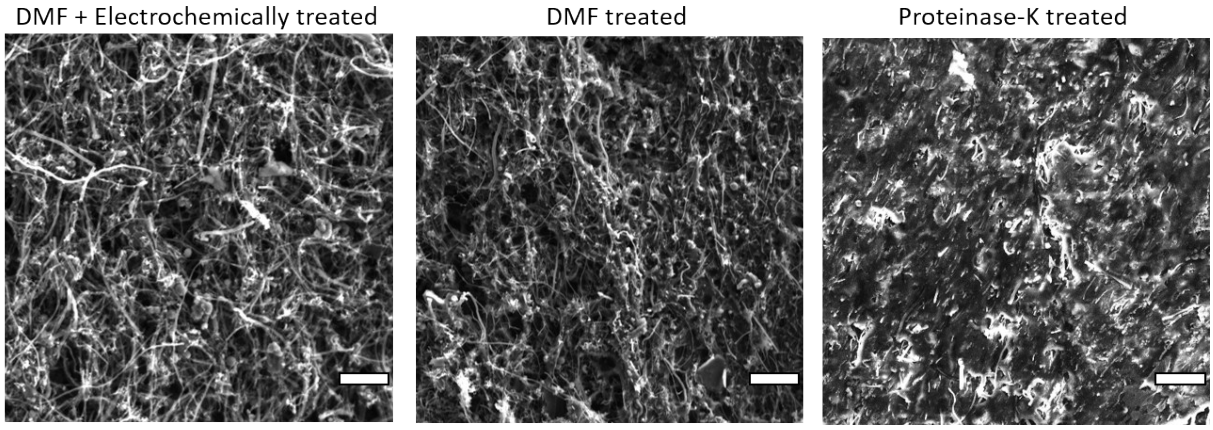

Figure S4. Typical SEM images of different treatments: DMF-assisted partial PLA dissolution followed by electrochemical pre-treatment as described in Ref. 4.; DMF treatment as described in Ref. 5; proteinase-K treatment as described in this work. Scale bars: 5 µm.

References

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