Electronic Supplementary Information

Fully Transient Electrochemical Testing Strips for Eco-friendly Point of Care Testing

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The detailed definition of dissolution rate:

$$m_{sub-initial} + m_{cen} = m_{total-initial} \quad (1)$$

$$m_{total-initial} - m_{total-after} = m_{sub-loss} \quad (2)$$

$$dissolution\ rate = 100\% \times m_{sub-loss}/m_{sub-initial} \quad (3)$$

The mass of each substrate sample (10×20 mm) $m_{sub-initial}$ is recorded before putting into a centrifuge tube which is also pre-weighed as m_{cen}. The total mass of a substrate sample and a centrifuge tube before immersion is defined as $m_{total-initial}$ ($Eqa.(1)$). Then, we divide all the samples into eight groups according to different immersion time (which is 0 min, 30 min, 2 h, 12 h, 1 d, 3 d, 10 d and 14 d respectively) and fill the centrifuge tubes with DI water (4mL) to create the degradable environment. After immersion, all the groups should eliminate the degraded part of the substrate and be dried at 45 °C for 48 hours to ensure the minimal water residual before weighed as $m_{total-after}$. Since the substrate sample is the only part with mass loss, we can define $m_{sub-loss}$ as the difference between $m_{total-after}$ and $m_{total-initial}$ ($Eqa.(2)$). The dissolution rate is then defined and determined as the ration of the substrate's mass loss ($m_{sub-loss}$) to the initial mass $m_{sub-initial}$ ($Eqa.(3)$).

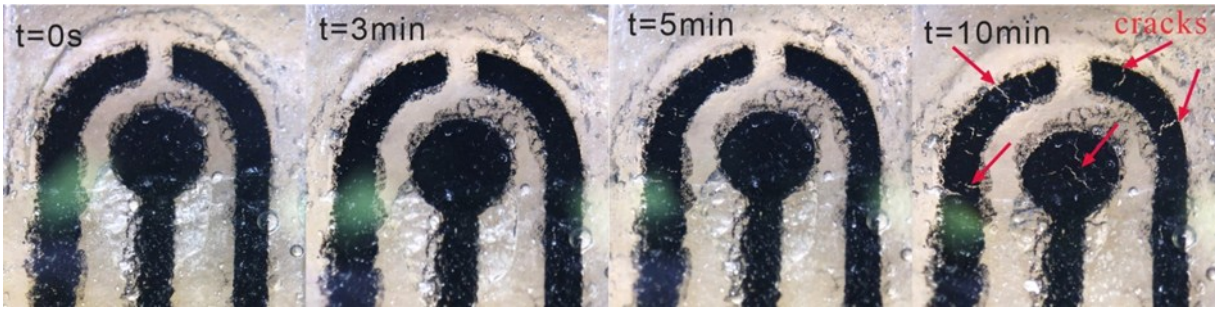

Figure S1 Photographs of morphologic change in sensing area in the first 10 minutes during the dissolution process.

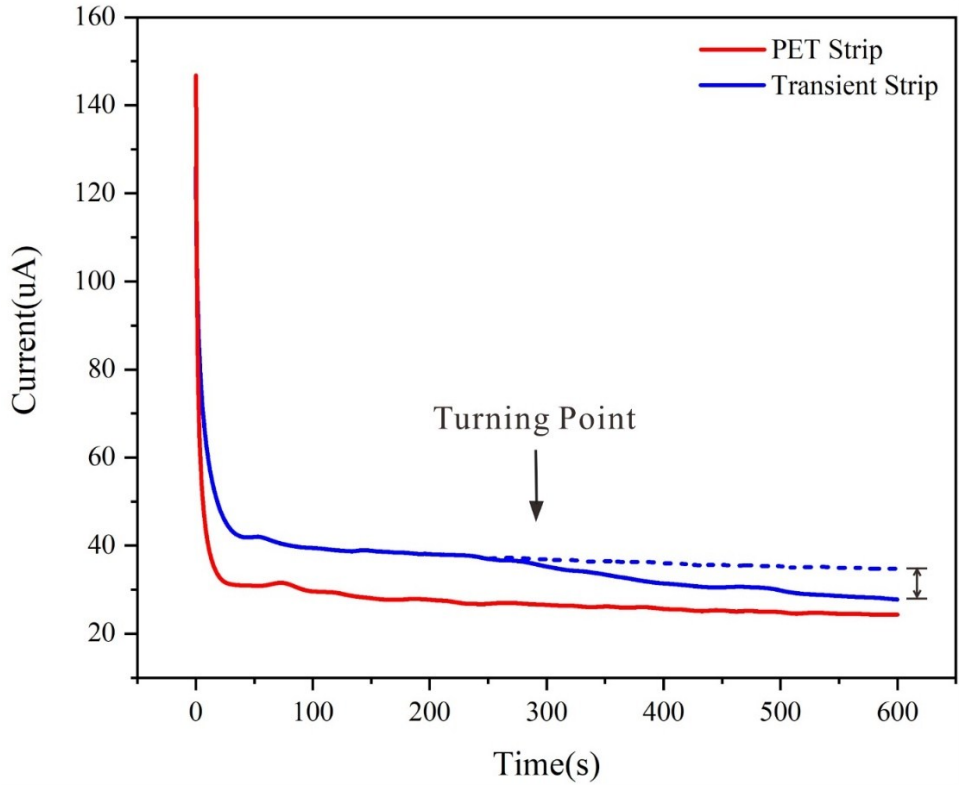

Figure S2 Typical electrochemical performance between PET-based strips and transient strips in 50mM $K_3Fe(CN)_6$ solution.

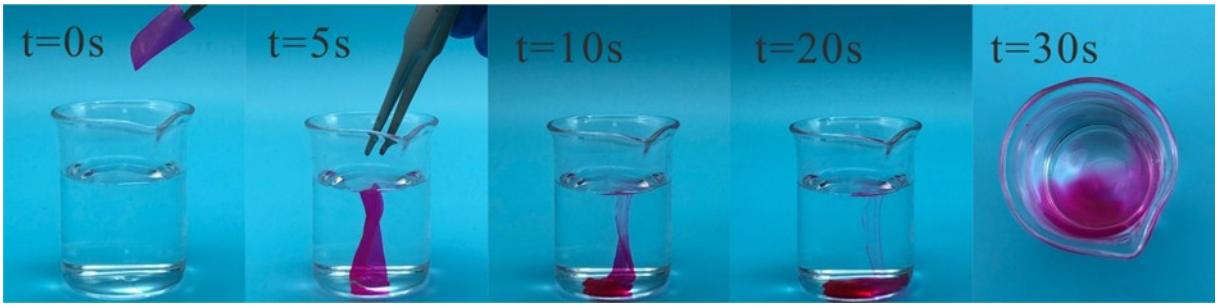

Figure S3 Dissolution process of colored Na-CMC substrate.

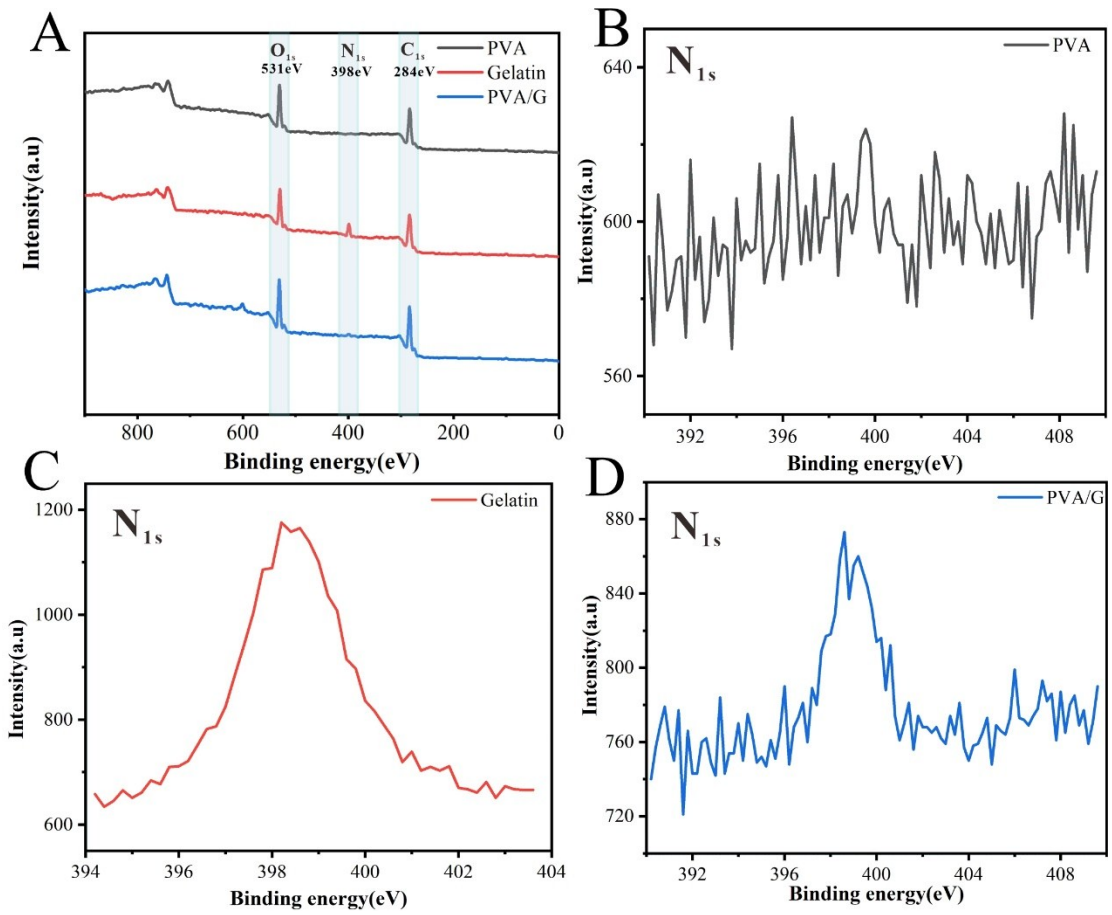

Figure S4 The XPS characterization of degradable substrates indicating the existence of gelatin. **A)** The survey spectrum of PVA, gelatin and PVA/G samples. **B)** The high-resolution spectra of N1s in PVA sample. **C)** The high-resolution spectra of N1s in gelatin sample. **D)** The high-resolution spectra of N1s in PVA/G sample.

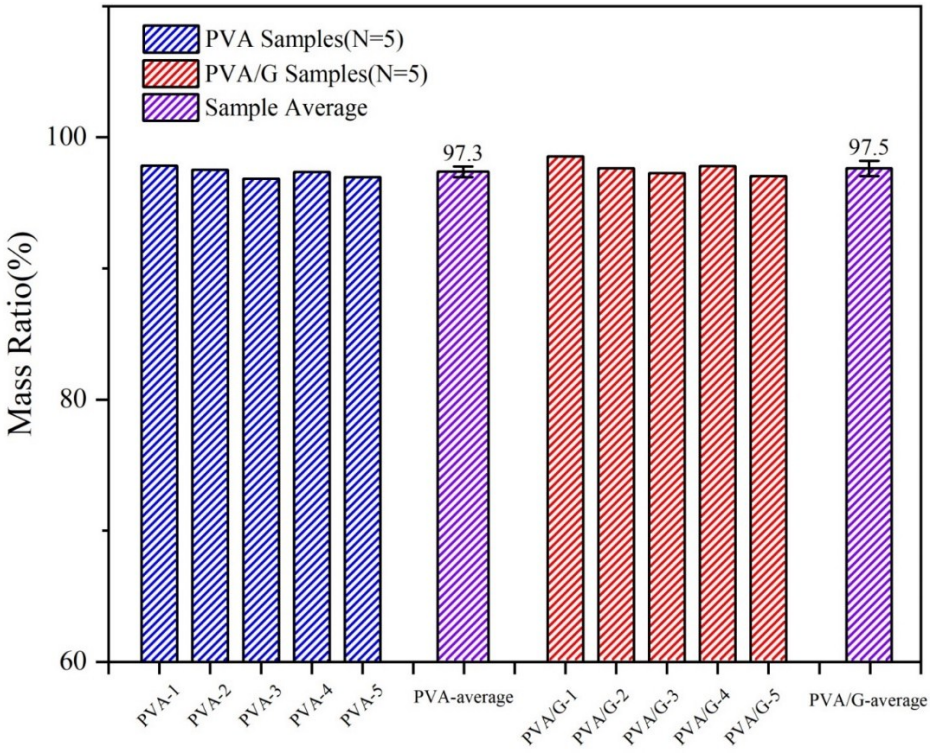

Figure S5 Mass changes of PVA and PVA/G substrates before dissolution experiment (N=5).

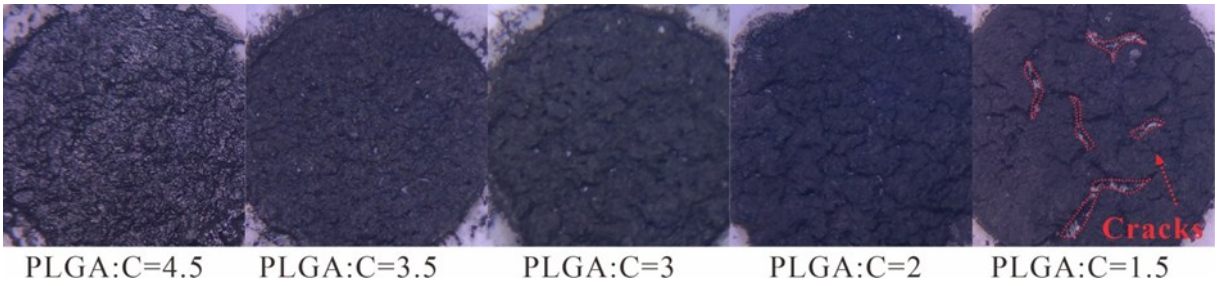

Figure S6 Different sample appearance under variant ratios of PLAG to carbon materials.

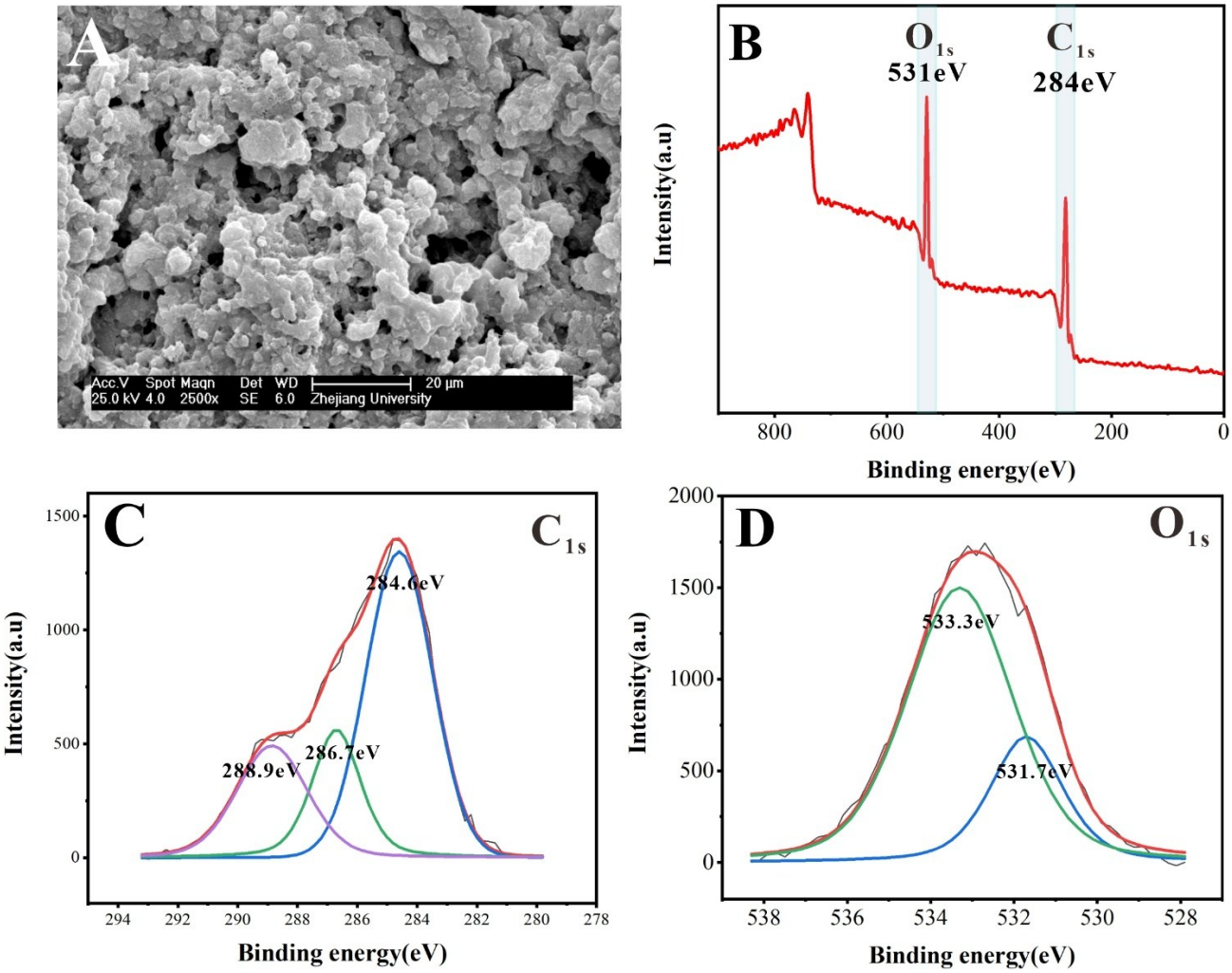

Figure S7: The XPS characterization of degradable carbon paste indicating the existence of PLGA. **A)** The low-resolution SEM image of degradable carbon paste with PLGA and carbon-based materials. **B)** The survey spectrum of PLGA/C. **C)** C1s peak deconvolution of PLGA/C. **D)** O1s peak deconvolution of PLGA/C.

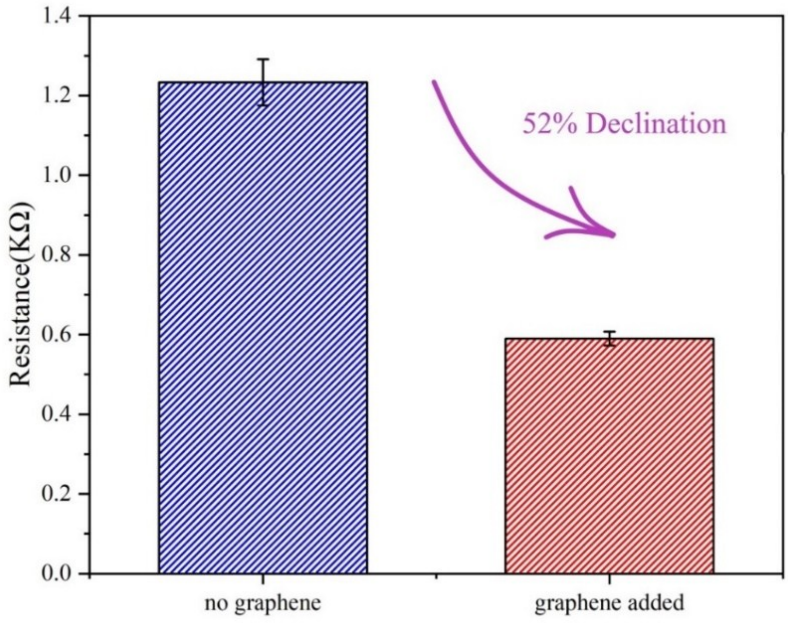

Figure S8 Resistance comparison with and without graphene.

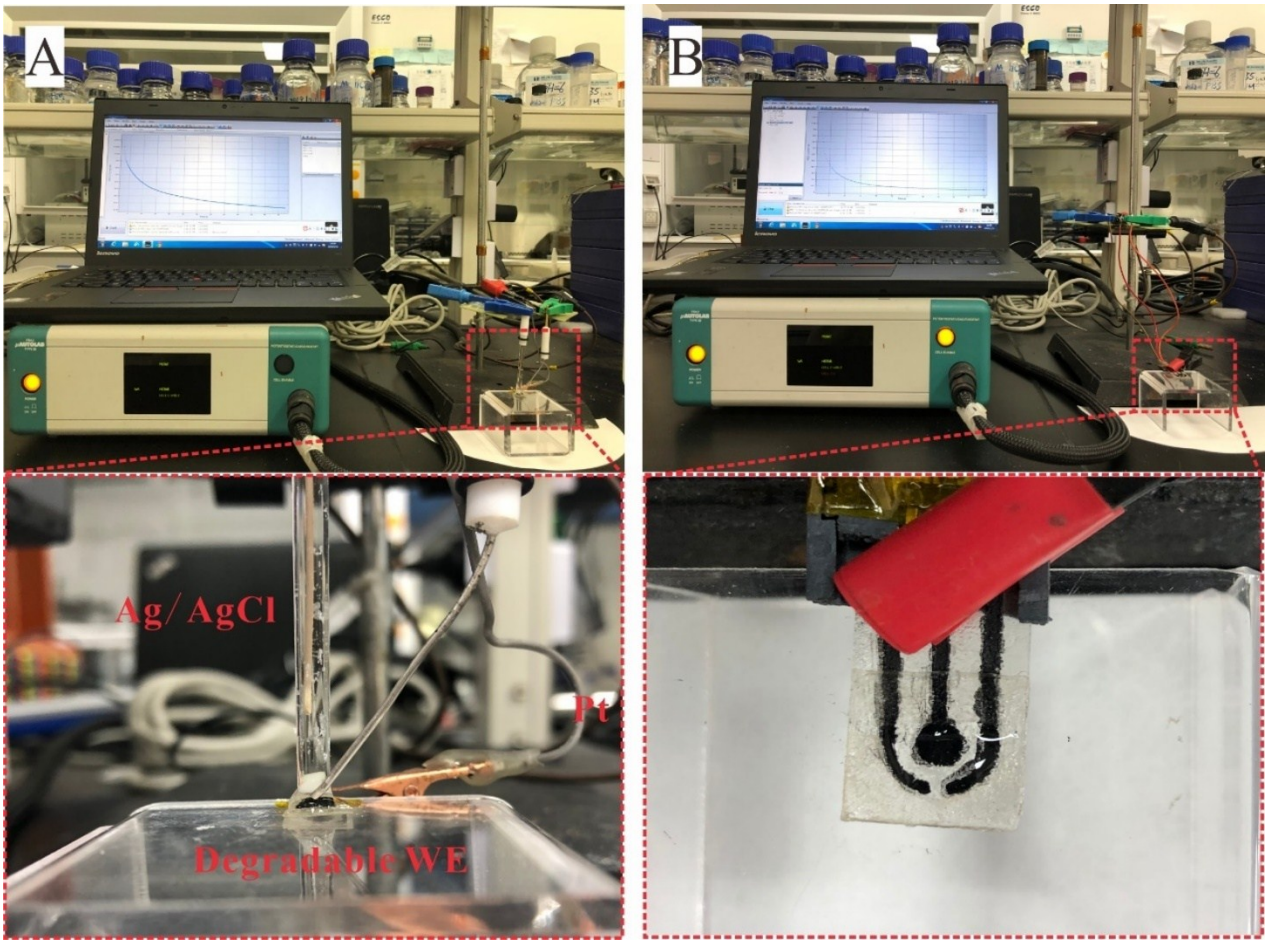

Figure S9 The electrochemical testing platforms of fully transient sensors. **A)** The test platform used in manuscript with a degradable working electrode, a standard Ag/AgCl reference electrode and a Pt rod. **B)** The test platform used for all-carbon-electrode degradable sensors.

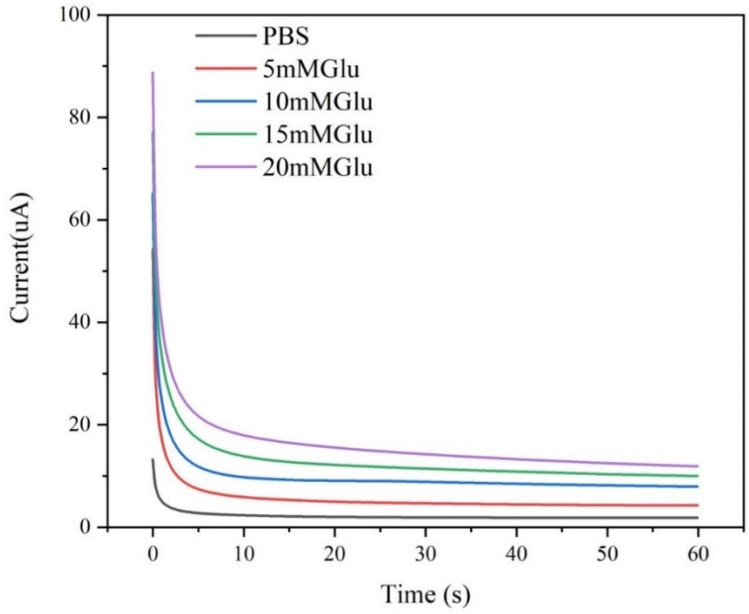

Figure S10 Results of detecting the mixed solution of GO_x and glucose with diverse concentrations (0 mM,5 mM,10 mM,15 mM,20 mM). The experiment was carried out until the enzymatic reaction was completed and enough $K_4Fe(CN)_6$ can be detected.

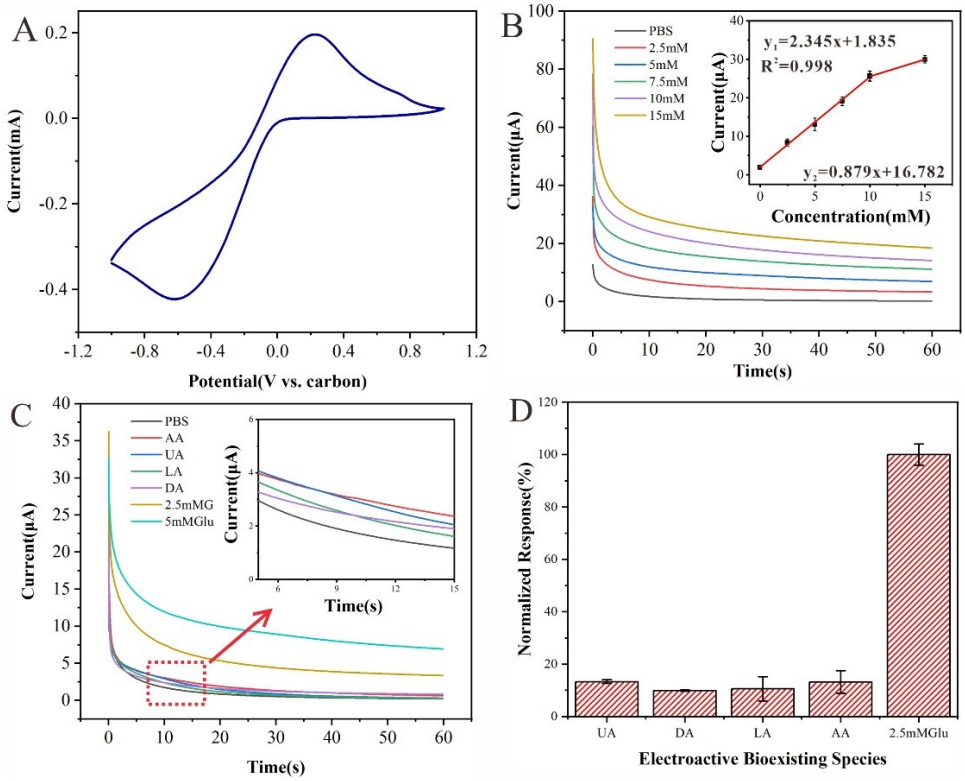

Figure S11 Electrochemical characterizations of all-carbon-electrode degradable sensors. **A)** Cyclic voltammogram (CV) of all-carbon-electrode degradable sensors in 50mM $K_3Fe(CN)_6$ solution. **B)** Typical amperometric responses of sensors to glucose with different concentrations and corresponding linear fit. **C)** Interference tests of all-carbon-electrode degradable sensors in 100μM AA, 100μM LA, 100μM DA and 50μM UA respectively (with detailed current response of four interference compared to PBS in enlarged image). **D)** The normalized current signals comparing the interfering species to glucose. The applied potential is 0.15 V vs. carbon in all amperometric measurements.