

Supplementary methods

Measurement of electrochemical impedance

The electrochemical impedance of NPG film is measured by three-electrode system in 5 mM $\text{K}_4[\text{Fe}(\text{CN})_6]$, 5 mM $\text{K}_3[\text{Fe}(\text{CN})_6]$ and 0.1 M KCl solution. The initial and ending frequency is 1000 kHz and 1 Hz, and open circuit potential is set up as 0.1985 V.

H_2O_2 sensing performance of NPG in biological sample

The milk sample was chosen for measurements. Before measurements, the milk sample was first centrifuged for 10 min in rotation speed of 10000 rpm to remove protein, then, the as-processed milk was diluted for 10 times by deionized water, next, the processed milk sample was filtered by 0.22 μm aqueous membrane, last, H_2O_2 with different concentrations were added into the processed milk sample. The processed milk samples containing different concentrations of H_2O_2 were prepared by adding different volumes of H_2O_2 to this supernatant and were deoxygenated by bubbling with nitrogen for 10 min for recovery experiments ^[1,2].

The recovery measurements were carried out in 50 ml N_2 -saturated 0.2 M PBS solution with processed milk sample by potentiostat (i-t). The recoveries of H_2O_2 in milk samples were calculated using the corresponding linear regression equation as shown in the insert of Fig. 6.

Supplementary Figure

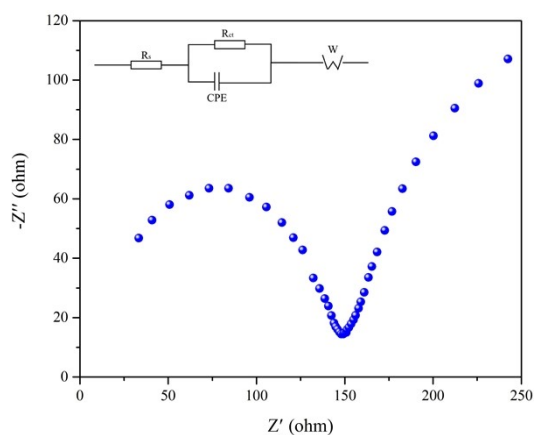


Fig. S1. Nyquist plot of NPG film etched from triple a-Ge/Au/a-Ge precursor film.

Supplementary Table

Table S1 H₂O₂ sensing performance of NPG film in milk sample.

Sample	Added (mM)	Found (mM)	Recovery (%)	Relative standard deviation (%)
Milk	1	1.01	101.0	2.42
	2	1.93	96.5	3.93
	5	4.92	98.4	2.57

Supplementary References

1. H. Guan, Y. Zhao, J. Zhang, Y. Liu, S. Yuan, and B. Zhang, *Sens. Actuators B Chem.*, 2018, 261, 354-363.
2. H. J. Guan, Y. Liu, Z. J. Bai, J. Zhang, S. G. Yuan, and B. Zhang, *Mater. Chem. Phys.*, 2018, 213, 335-342.