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Simultaneous Electrochemical Detection of Ozone and Free Chlorine with a Boron-doped Diamond Electrode

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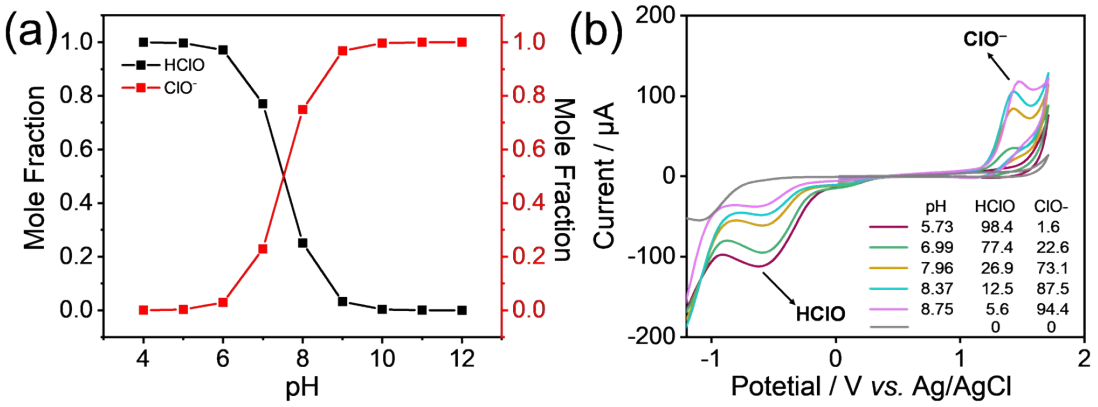

Figure S1. (a) pH-dependence feature of free chlorine; (b) Cyclic voltammograms for 100 ppm free chlorine in various pH solutions. (Electroreduction peak of HClO@-0.57V; Electrooxidation peak for ClO^-@1.42V; Gray line: tested in pure electrolyte as the background)

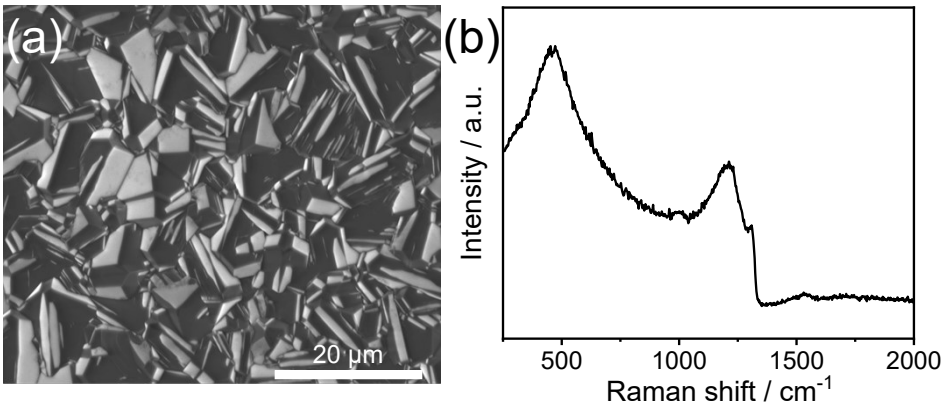

Figure S2. (a) Scanning electron microscopy (SEM) of the synthetic BDD electrode; (b) Raman spectrum of the synthetic BDD electrode.

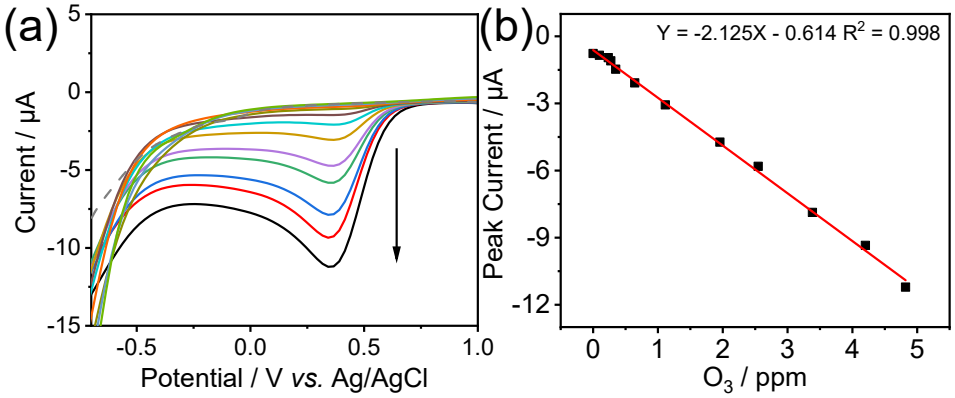

Figure S3. (a) Cyclic voltammograms of different concentrations of O_3 from 0 ppm to 5 ppm in the pH range from 4 to 5. The scan rate is 0.1 V/s; (Gray dash line: water without O_3) (b) Calibration curve of current to concentration, the R-squared value is above 0.99.

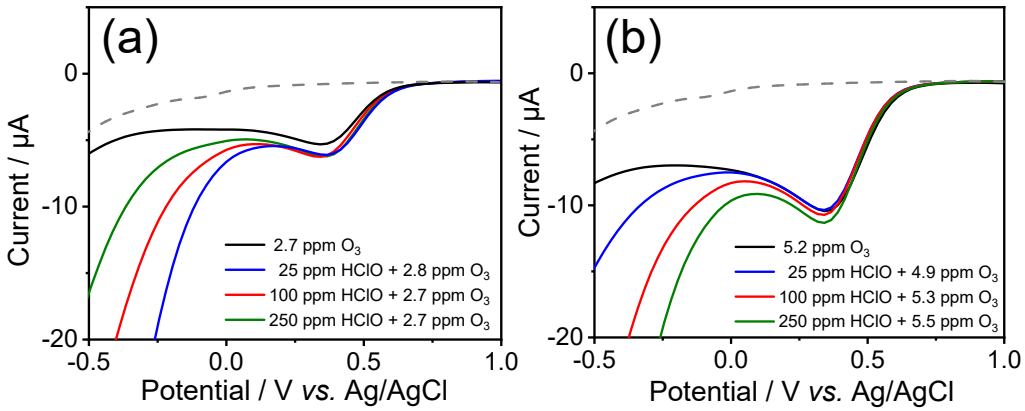

Figure S4. (a) Cyclic voltammograms of around 2.5 ppm O_3 and various concentrations of HClO; (b) Cyclic voltammograms of around 5 ppm O_3 and various concentrations of HClO; The reduction peak at 0.35 V is due to O_3. The pH is between 4 and 5. The scan rate is 0.1 V/s. (Gray dash line: tested in pure electrolyte as the background)

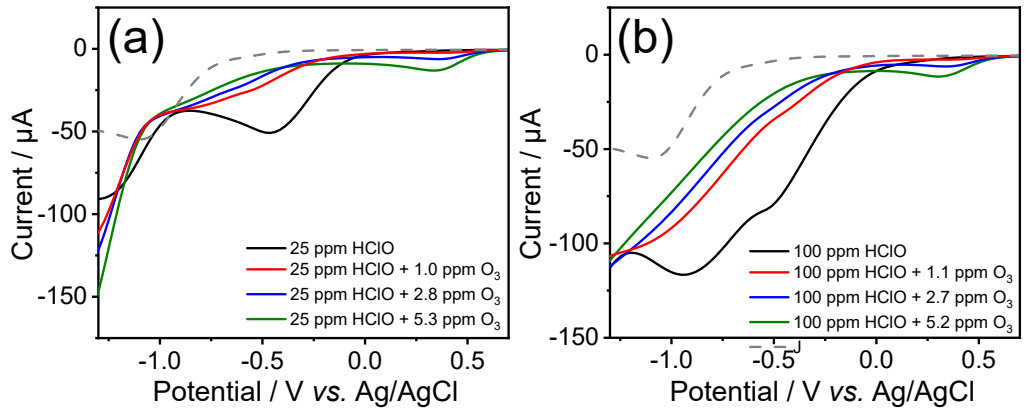

Figure S5. (a) Cyclic voltammograms of 25 ppm HClO with various concentrations of O_3. The reduction peaks at 0.35 and -0.48 V belong to O_3 and HClO, respectively; (b) Cyclic voltammograms of 100 ppm HClO with various concentrations of O_3; The pH is between 4 and 5. The scan rate is 0.1 V/s. The reduction peaks at 0.35 and -0.95 V belong to O_3 and HClO, respectively. (Gray dash line: tested in pure electrolyte as the background)

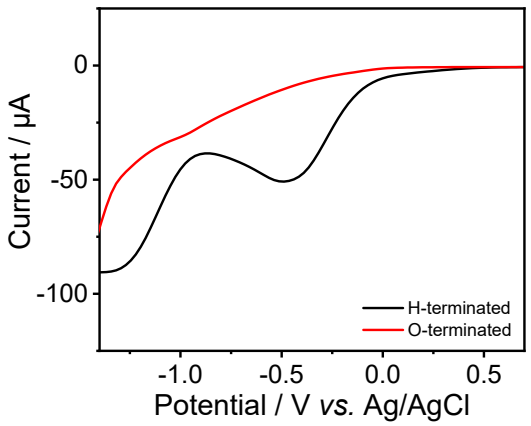

Figure S6. Cyclic voltammograms of 25 ppm HClO tested on BDD with H-terminated (black line) and O-terminated surfaces (red line) in the pH range from 4 to 5.

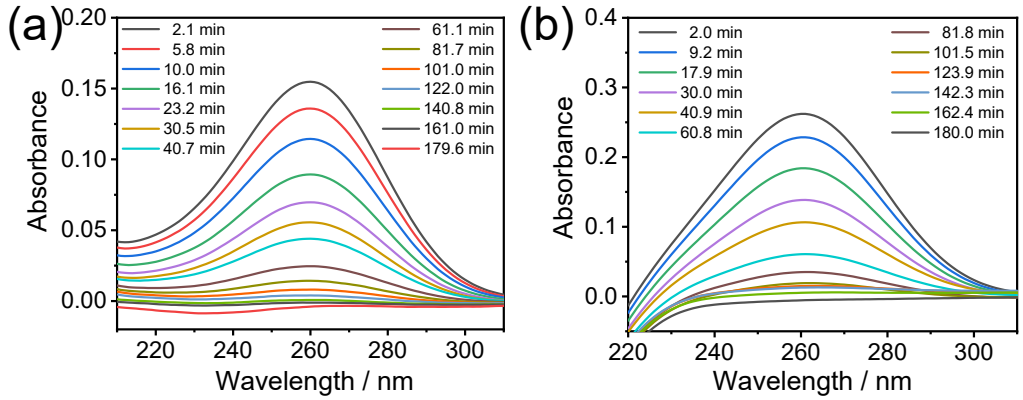

Figure S7. UV-vis data corresponding to (a) curve A (Black line: with 250 ppm HClO) and (b) curve B (Red line: without HClO) in Figure 3(a).

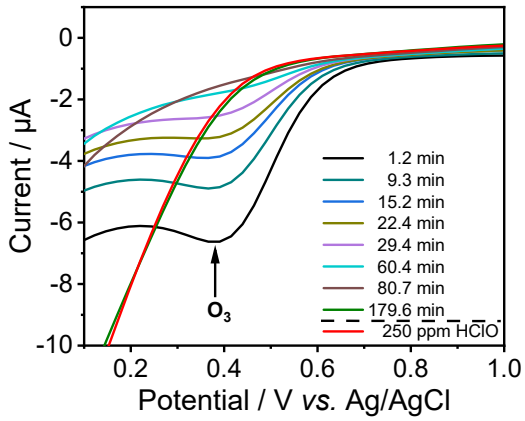

Figure S8. Cyclic voltammograms of residual O_3 in a mixture containing 250 ppm HClO in the pH range from 4 to 5. The scan rate is 0.1 V/s. (Red line: 250 ppm HClO)

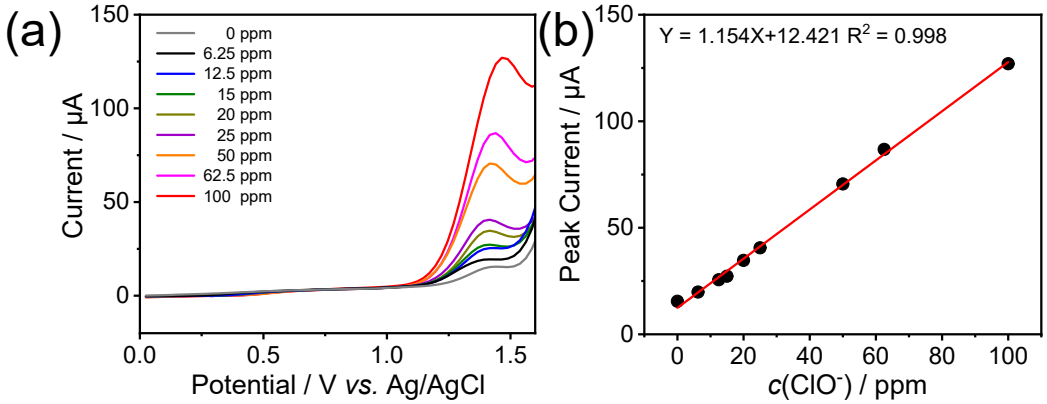

Figure S9. (a) Cyclic voltammograms of different concentrations of pure ClO^- from 0 to 100 ppm in the pH range from 9 to 10. The scan rate is 0.1 V/s; (b) Calibration curve of the current to concentration, the R-squared value is above 0.99.

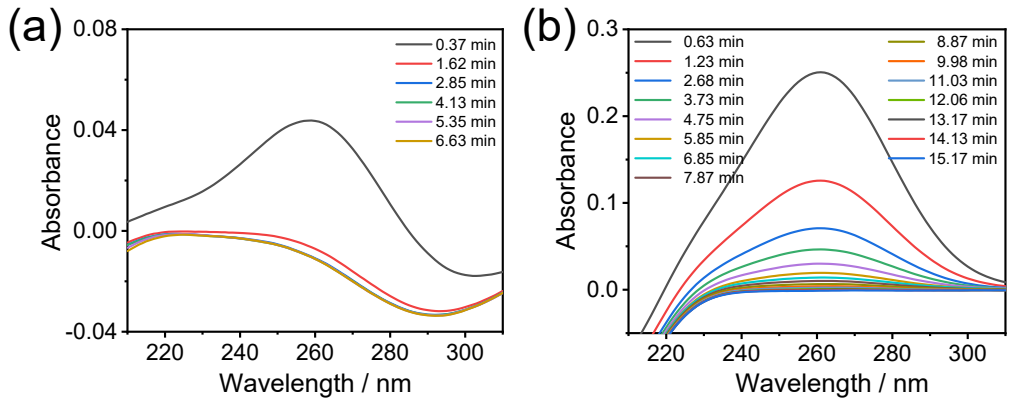

Figure S10. UV-vis data corresponding to (a) curve A (Black line: with 15 ppm ClO^-) and (b) curve B (Red line: without ClO^-) in Figure 4.

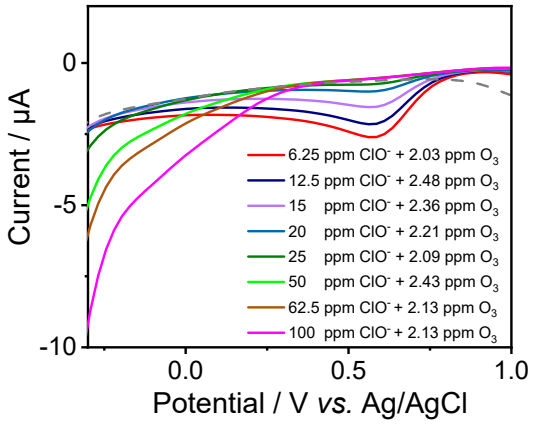

Figure S11. Cyclic voltammograms of about 2.5 ppm O_3 with various concentrations of ClO^- in a basic solution. The scan rate is 0.1 V/s. (Gray dash line: tested in pure electrolyte as the background)

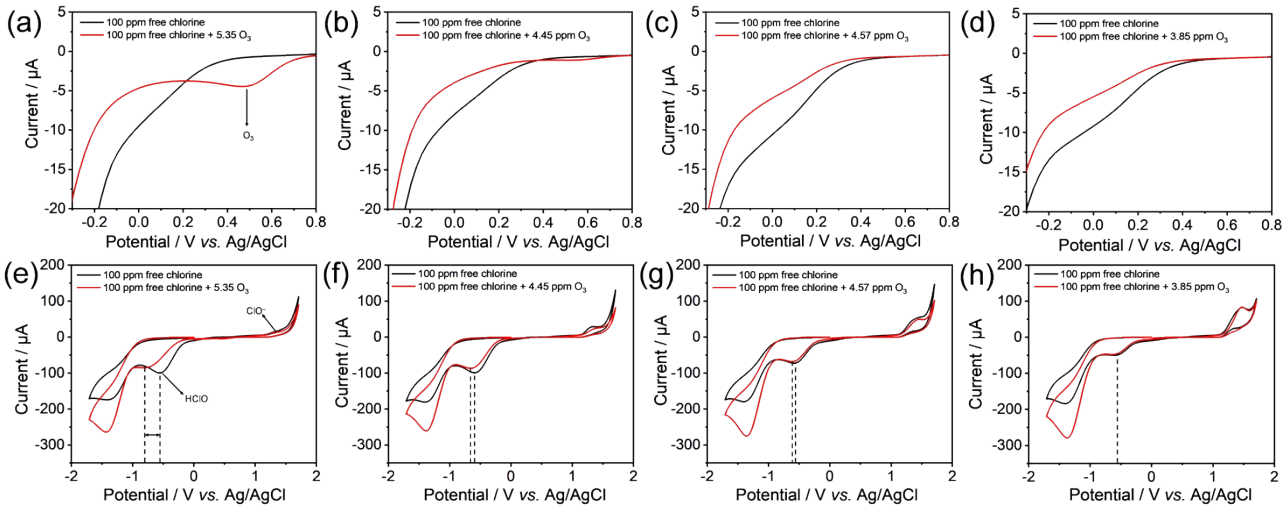

Figure S12. Cyclic voltammograms of 4~5 ppm O_3 and 100 ppm free chlorine in a mixed solution. CV figures for O_3: (a) pH is around 6; (b) pH is around 7; (c) pH is around 7.5; (d) pH is around 8. CV figures for HClO: (e) pH is around 6; (f) pH is around 7; (g) pH is around 7.5; (h) pH is around 8. The scan rate is 0.1 V/s.

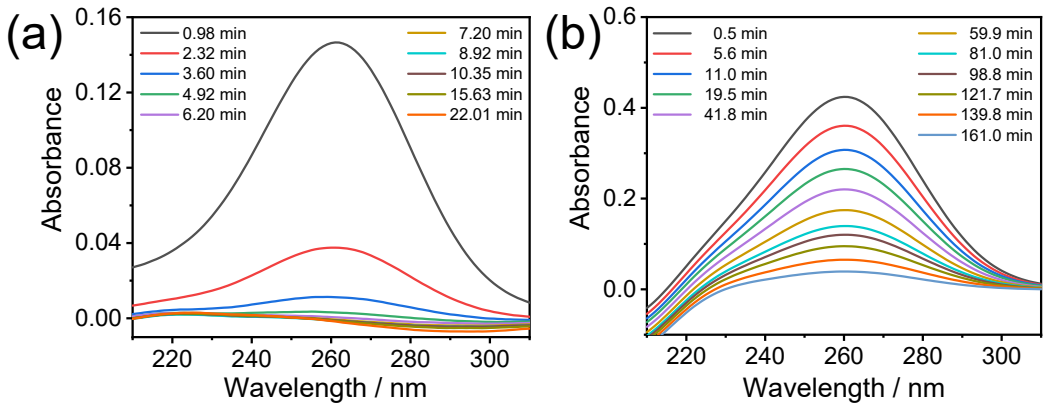

Figure S13. UV-vis data corresponding to (a) curve A (Black line: with 100 ppm free chlorine) and (b) curve B (Red line: without free chlorine) in Figure 6(a).

Table S1. The amount of HClO and ClO^- for 100 ppm of total free chlorine with various pH

pH	HClO/ppm	ClO^-/ ppm
6.0	97.1	2.9
7.0	77.0	23.0
7.5	51.0	48.5
8.0	25.1	74.9