Supplementary Information

Energy-efficient Production of Plasma-Activated Water: Insights into Controllable Peroxynitrite Chemistry

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This supplementary information contains the following sections:

S1. Discharge waveform (**Fig. S1-S5**)
S2. Discharge plasma platform (**Fig. S6**)
S3. Detection of RONS in the liquid (**Fig. S7-S9**)
S4. Supplementary Figures (**Fig. S10-S24**)

S1. Discharge waveform

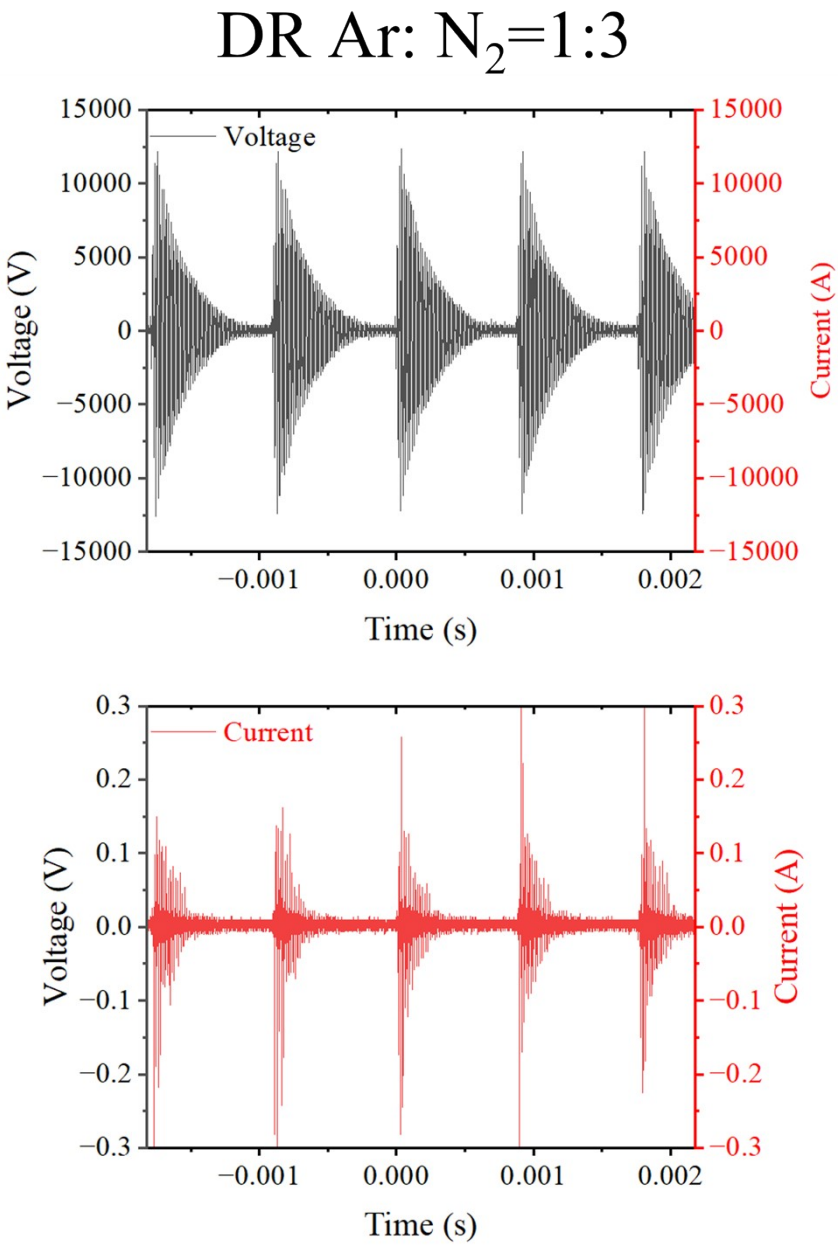

Fig. S1 The discharge waveform of DR (Ar : N_2=1:3).

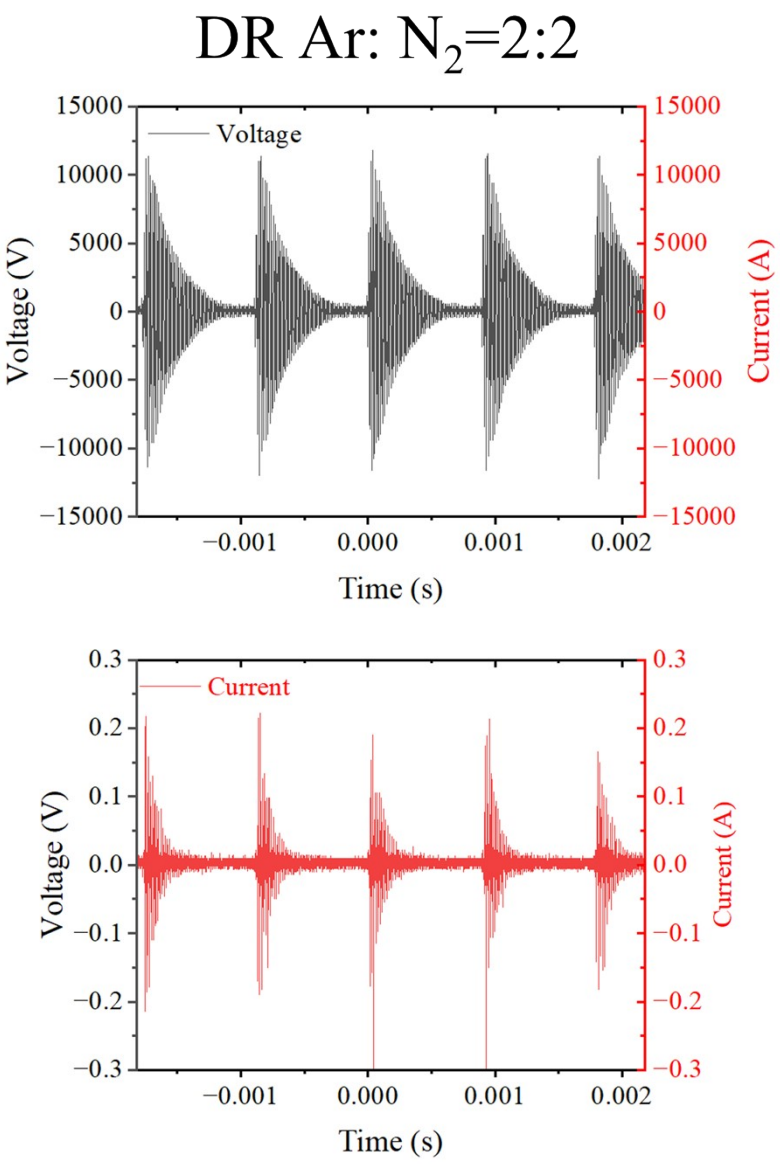

Fig. S2 The discharge waveform of DR (Ar : N_2=2:2).

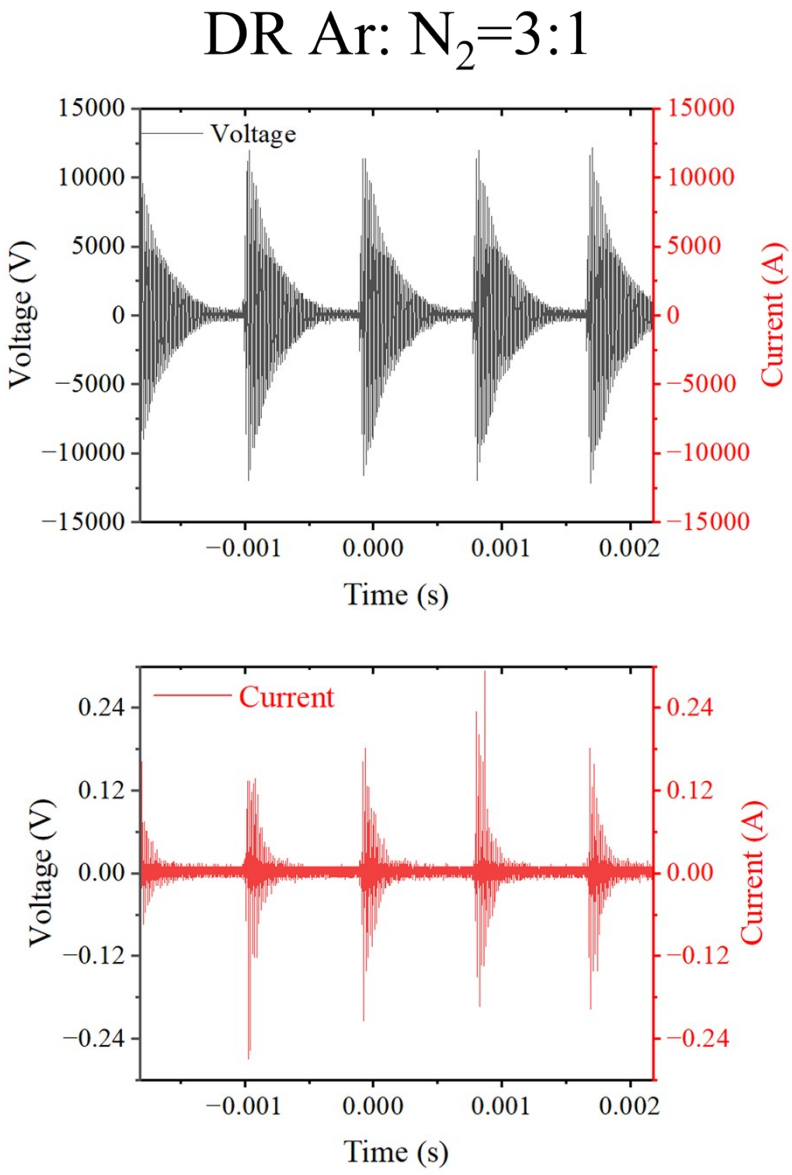

Fig. S3 The discharge waveform of DR (Ar : N_2=3:1).

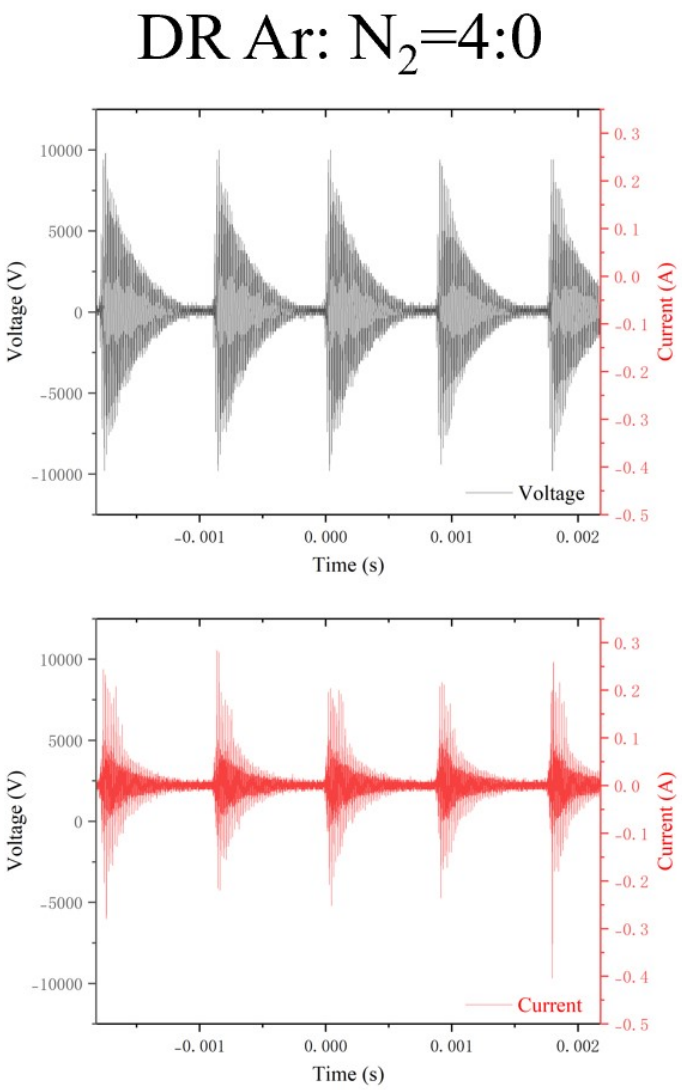

Fig. S4 The discharge waveform of DR (Ar : N_2=4:0).

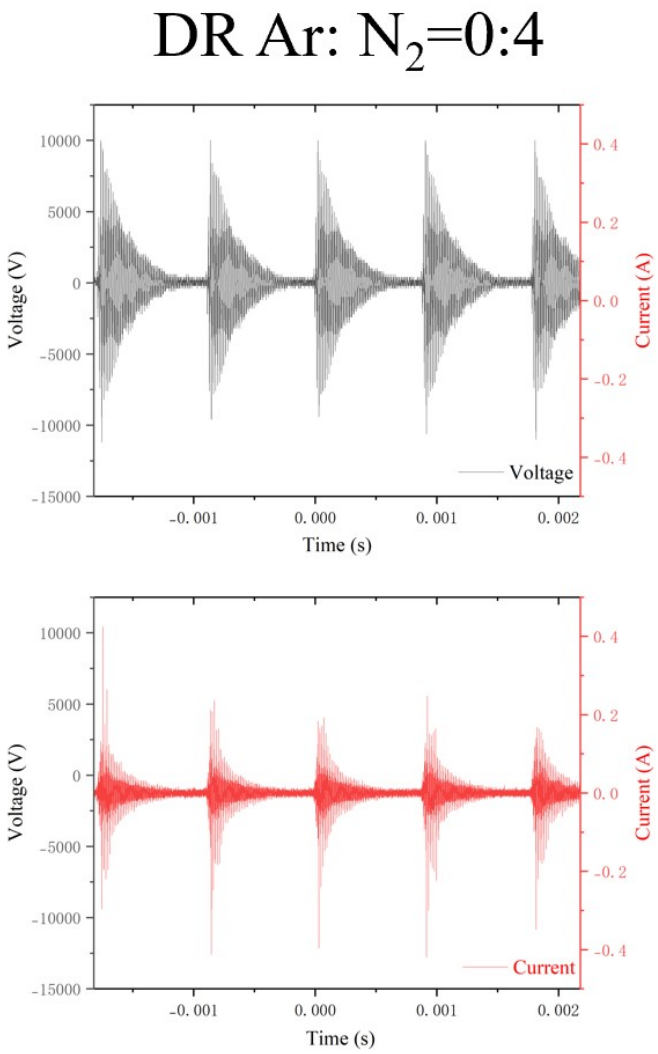

Fig. S5 The discharge waveform of DR (Ar : N_2=0:4).

S2. Discharge plasma platform (Fig. S6)

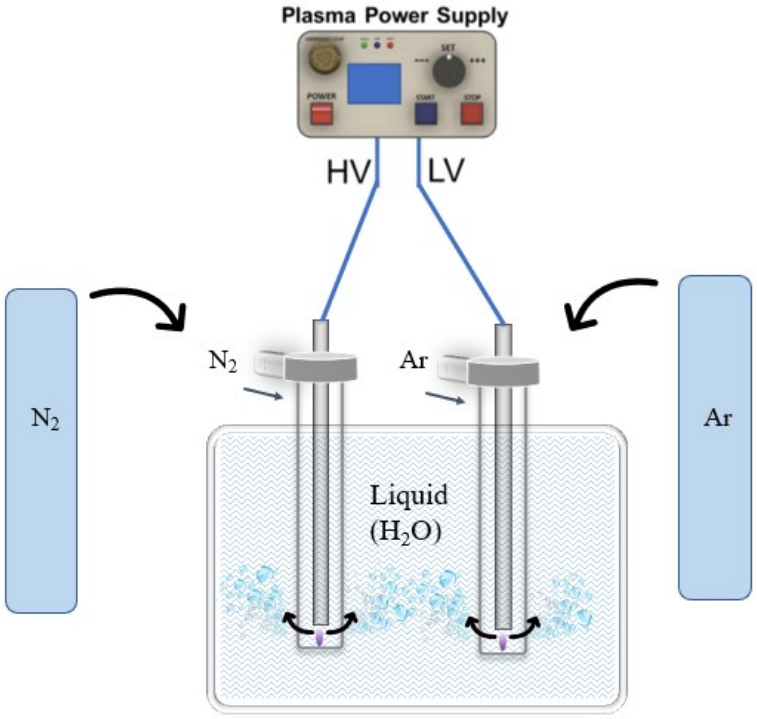

Fig. S6 Discharge plasma platform.

S3. Detection of RONS in the liquid

Liquid-phase reactive species are assayed according to the manual of the assay kit (Beyotime Biotech). The standard curve of H_2O_2 is shown in Fig. S7.

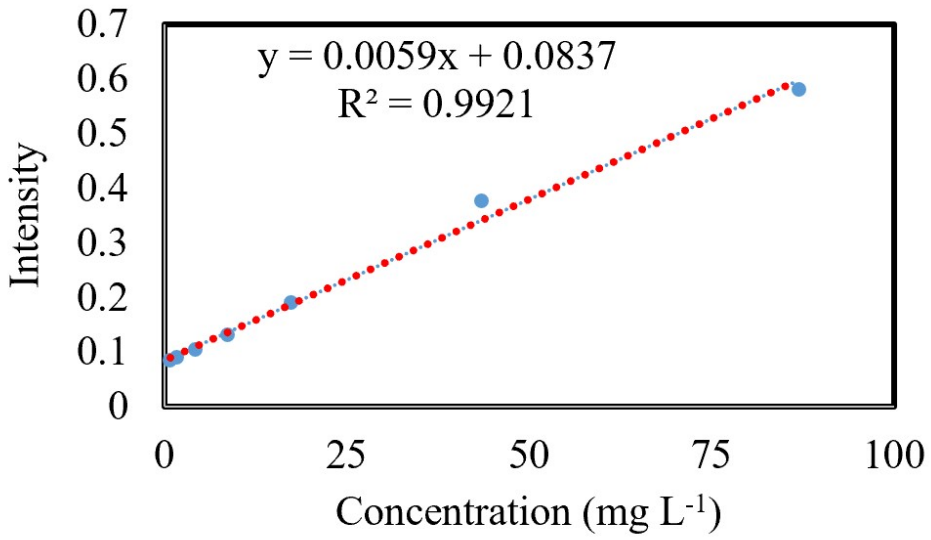

Fig. S7 The standard curve of H_2O_2 concentration

The principle of NO_3^- detection is to convert NO_3^- to NO_2^-, measure the total nitrogen concentration, and subtract the NO_2^- concentration. The standard curve of NO_2^- and the total nitrogen concentration (NO_2^- +NO_3^-) are shown in Fig. S8.

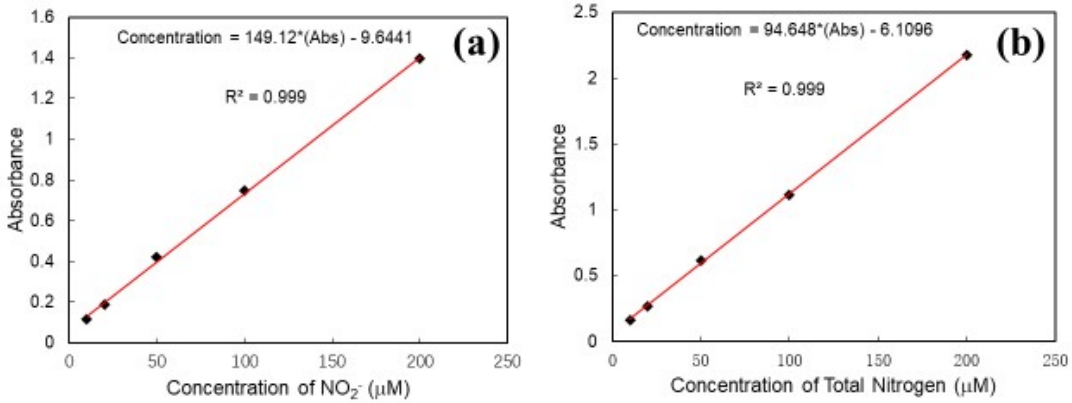

Fig. S8 The standard curve of (a) NO_2^- and (b) total nitrogen concentration

The $ONOO^-$ concentration was measured by the ESR spectroscopy with the corresponding spin traps, with 1 mM TEMPONE-H for trapping $ONOO^-$.

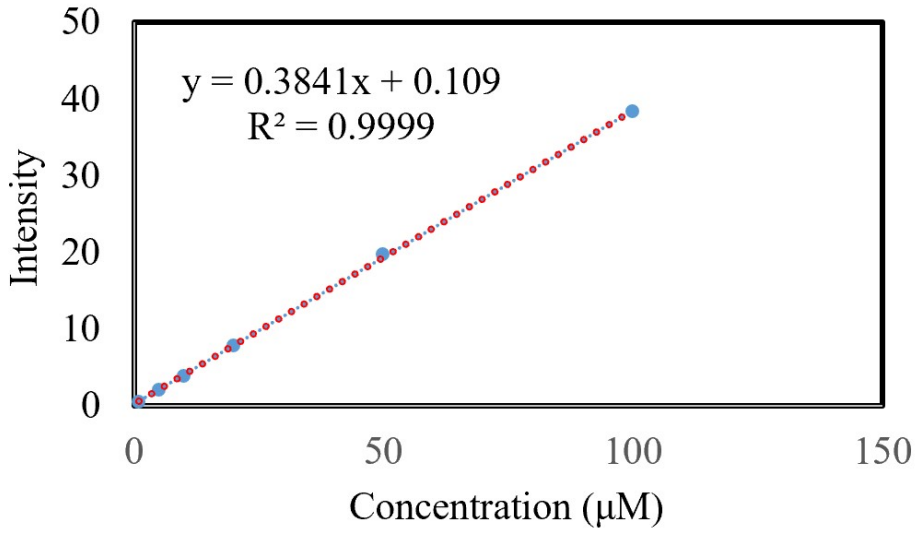

Fig. S9 The standard curve of $ONOO^-$ concentration.

S4. Supplementary Figures

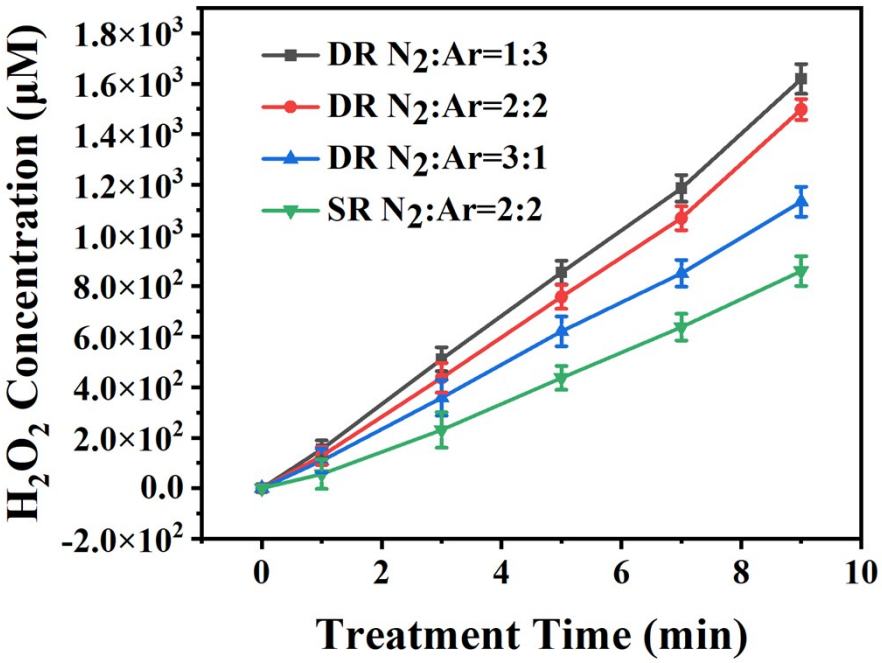

Fig. S10 The concentration of H_2O_2 curve of PAW with treatment time at 4 ℃.

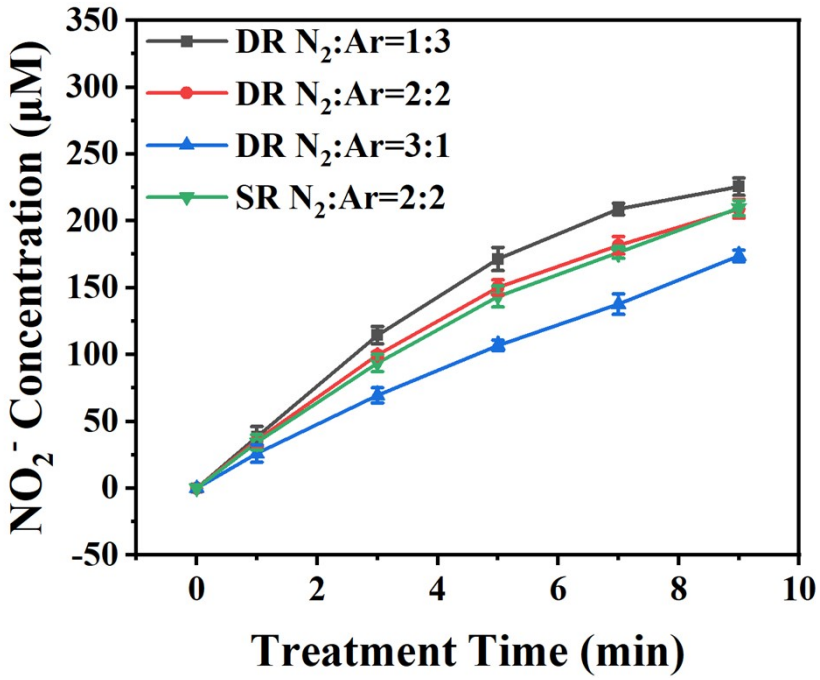

Fig. S11 The concentration of NO_2^- curve of PAW with treatment time at 4 ℃.

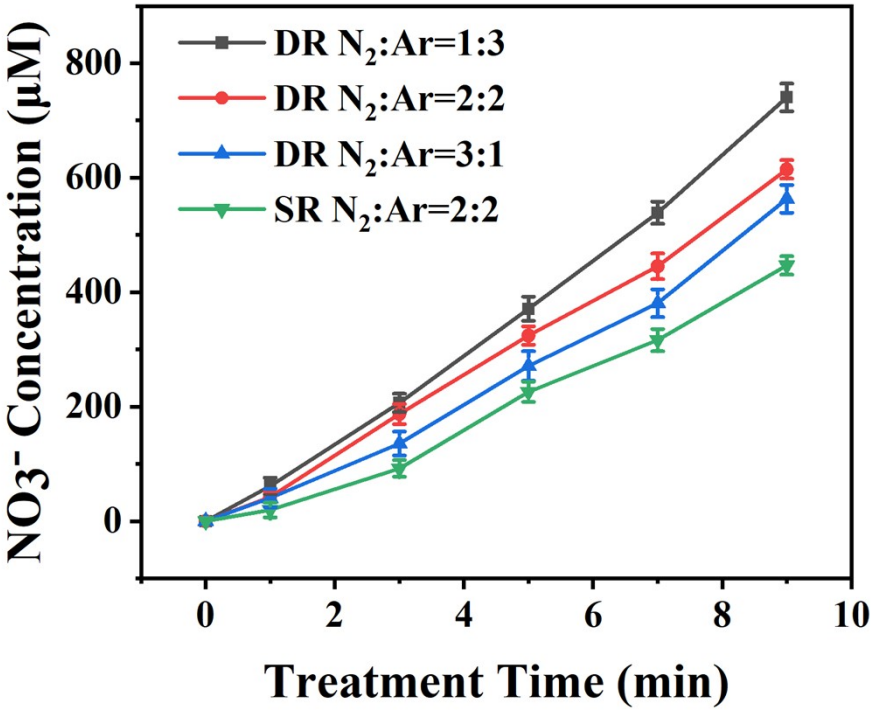

Fig. S12 The concentration of NO_3^- curve of PAW with treatment time at 4 ℃.

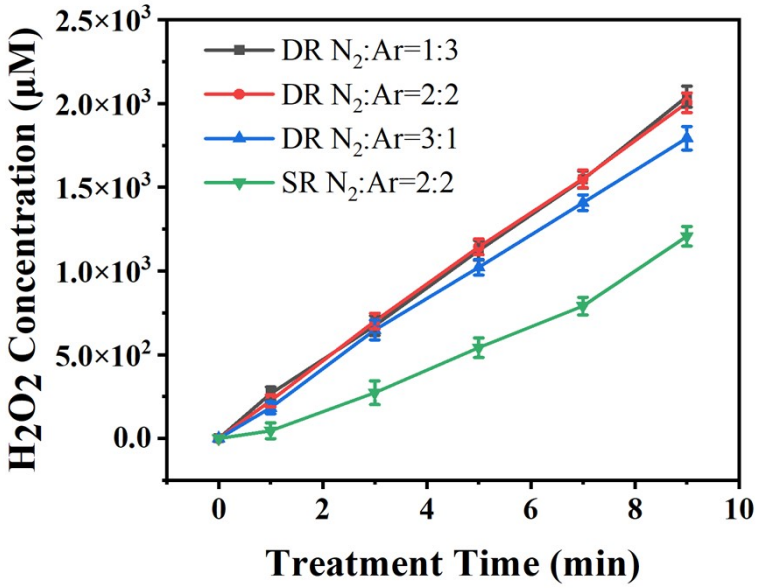

Fig. S13 The concentration of H_2O_2 curve of PAW with treatment time at 40 ℃.

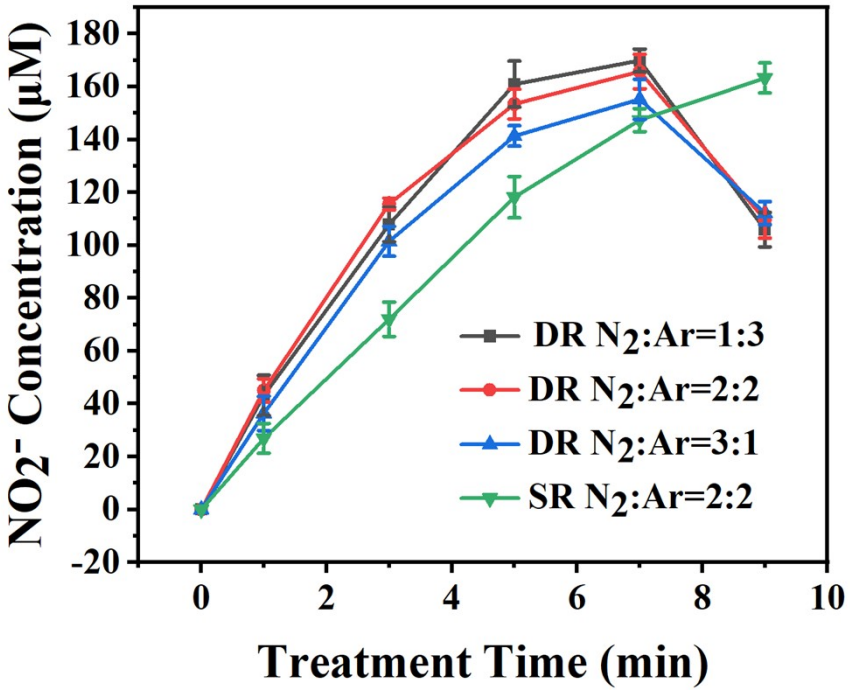

Fig. S14 The concentration of NO_2^- curve of PAW with treatment time at 40 ℃.

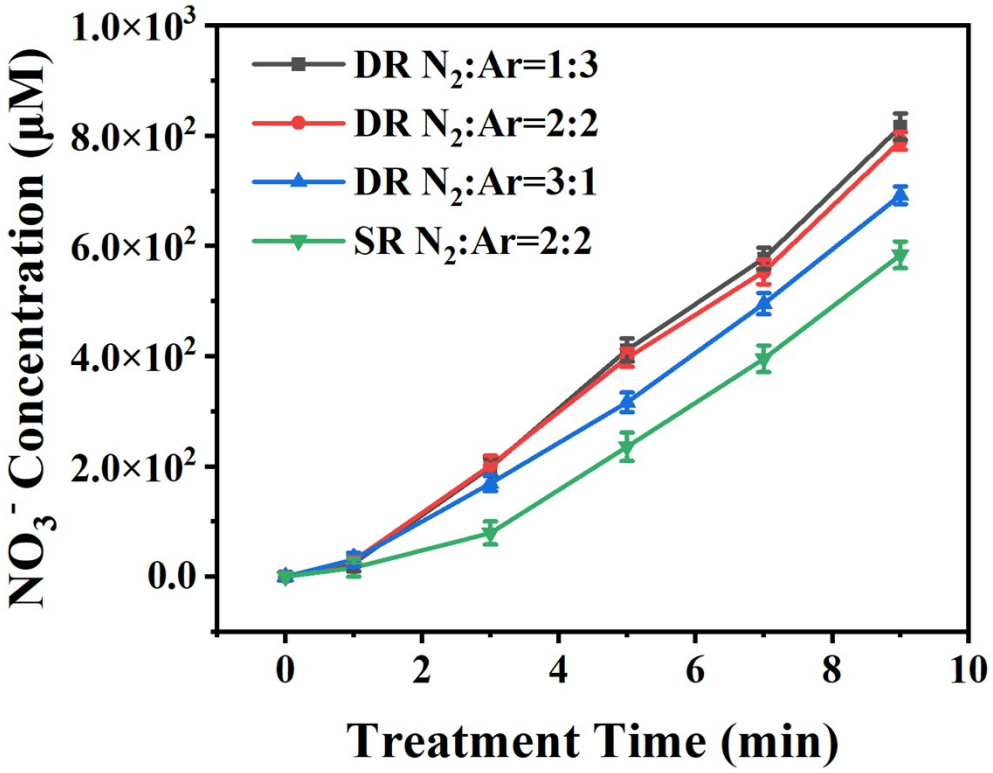

Fig. S15 The concentration of NO_3^- curve of PAW with treatment time at 40 ℃.

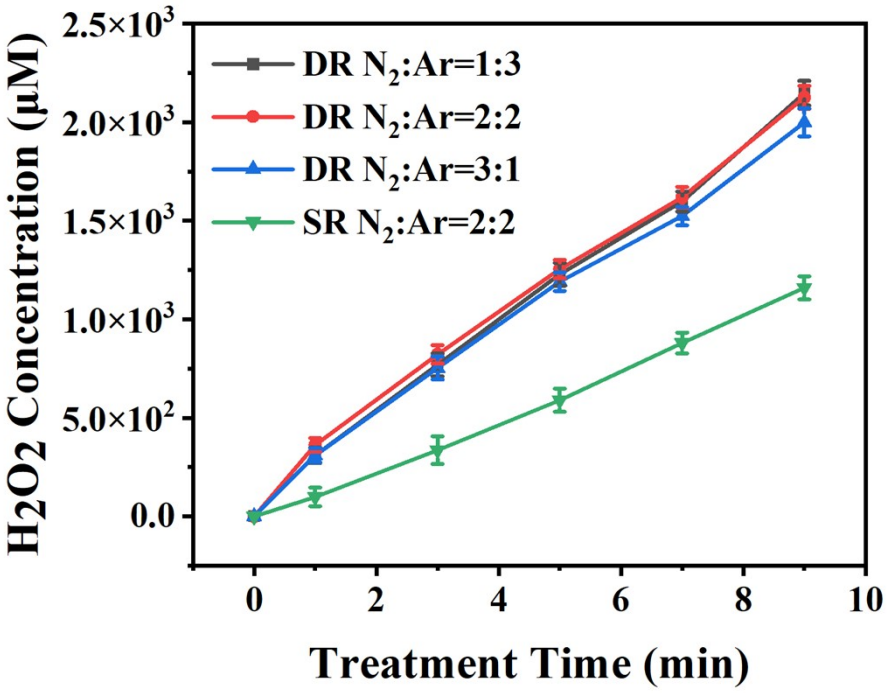

Fig. S16 The concentration of H_2O_2 curve of PAW with treatment time at 60 ℃.

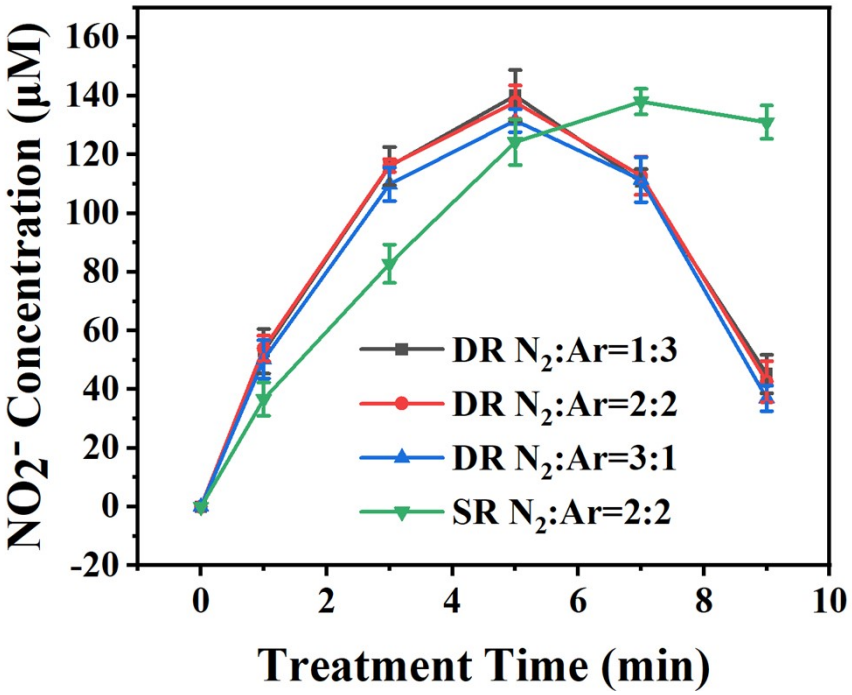

Fig. S17 The concentration of NO_2^- curve of PAW with treatment time at 60 ℃.

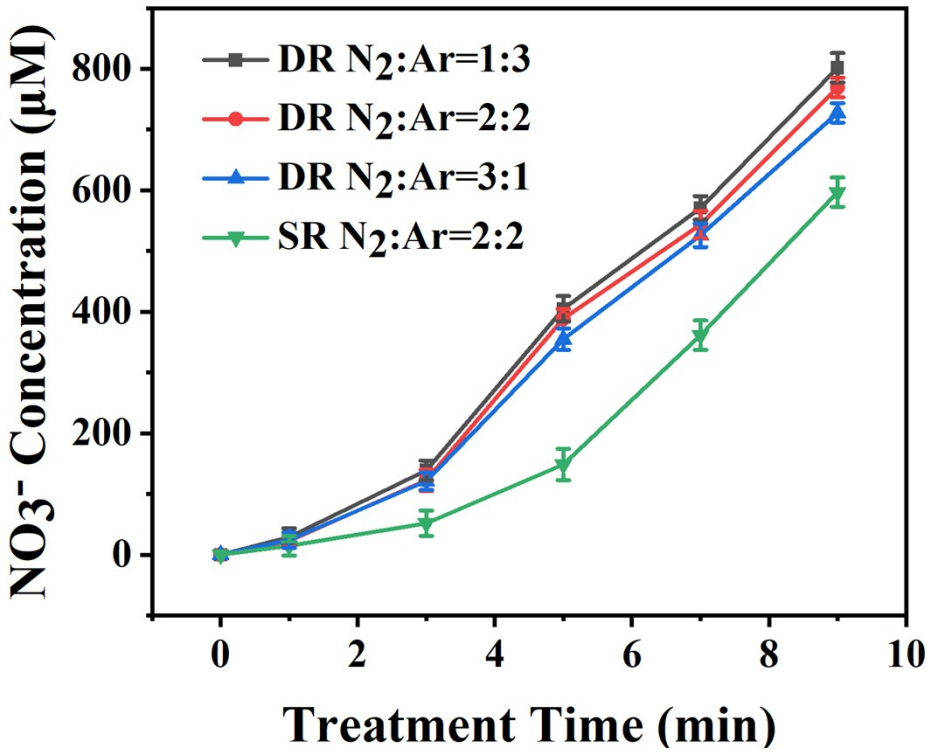

Fig. S18 The concentration of NO_3^- curve of PAW with treatment time at 60 ℃.

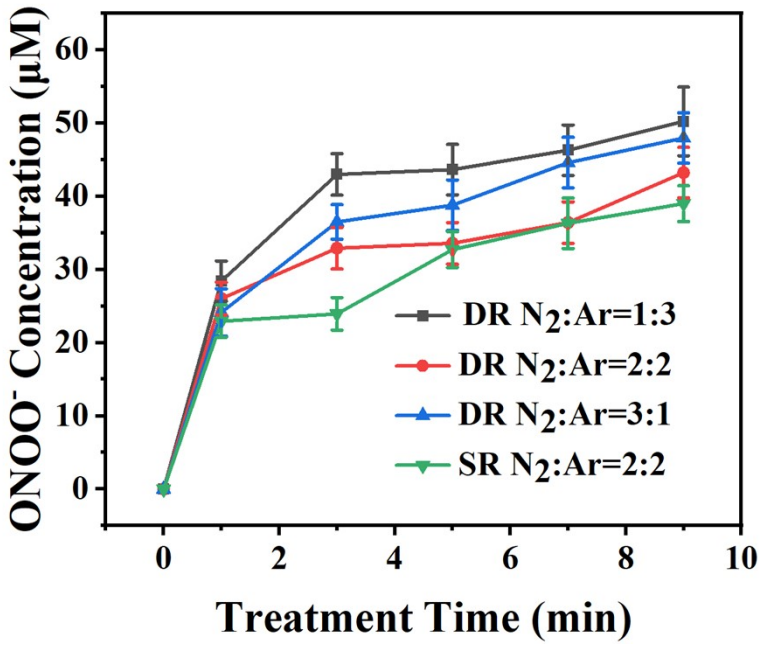

Fig. S19 The concentration of $ONOO^-$ curve of PAW with treatment time at 4 ℃.

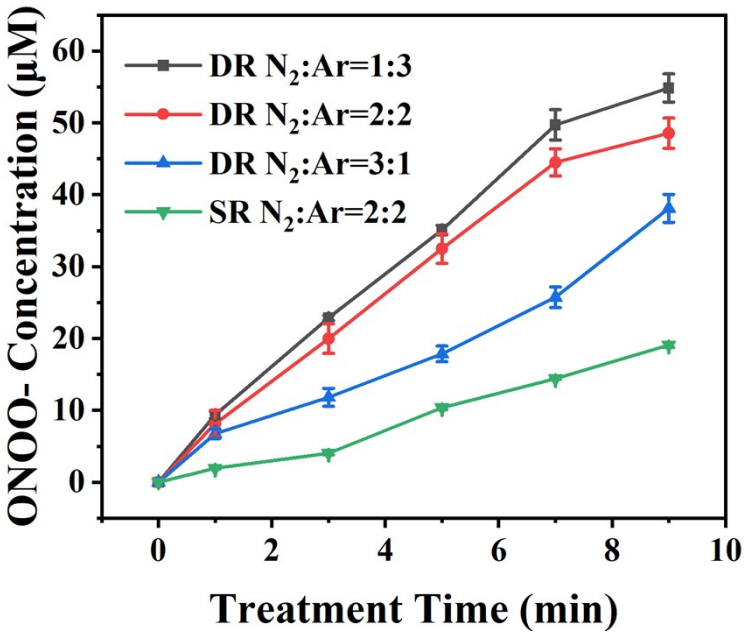

Fig. S20 The concentration of $ONOO^-$ curve of PAW with treatment time at 40 ℃.

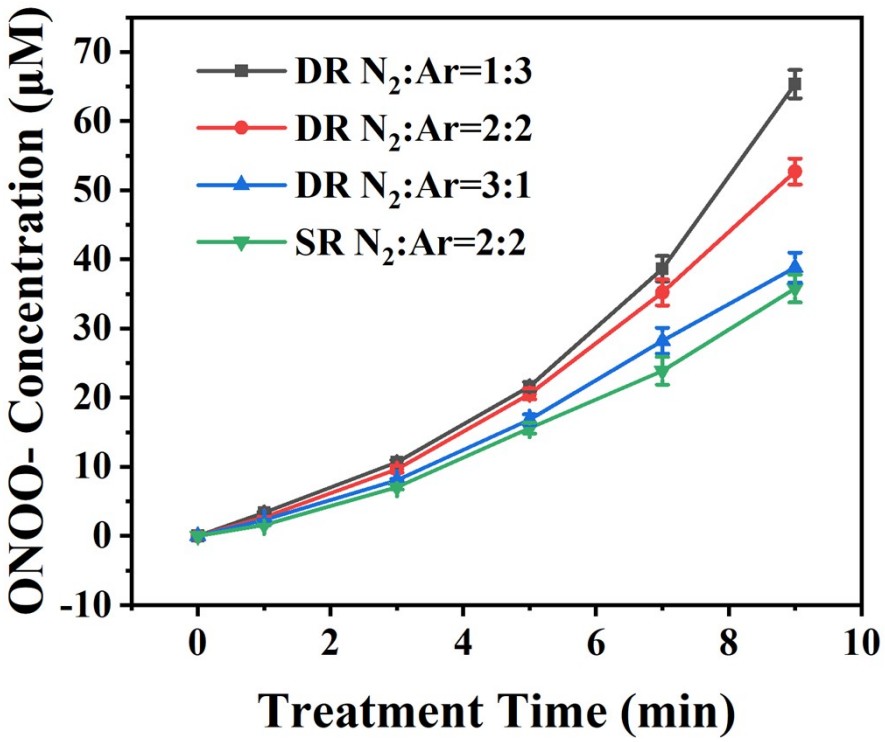

Fig. S21 The concentration of $ONOO^-$ curve of PAW with treatment time at 60 ℃.

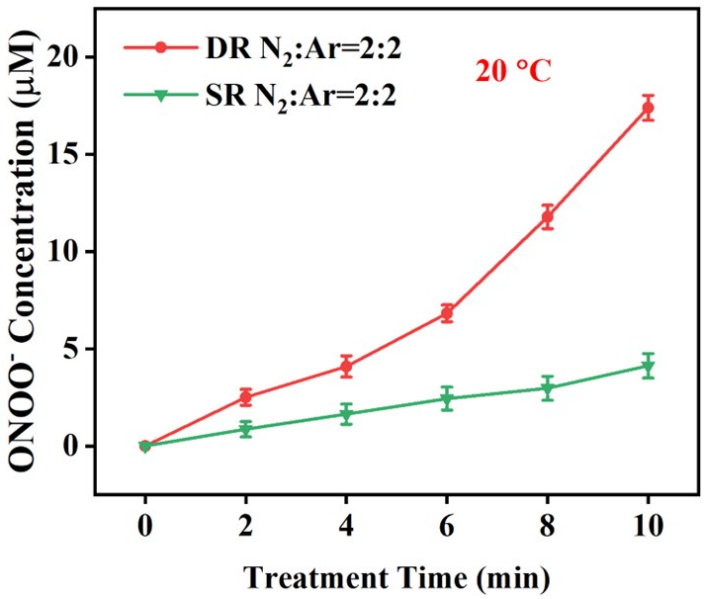

Fig. S22 The concentration of $ONOO^-$ curve of SR-PAW and DR-PAW with treatment time at 20 ℃.

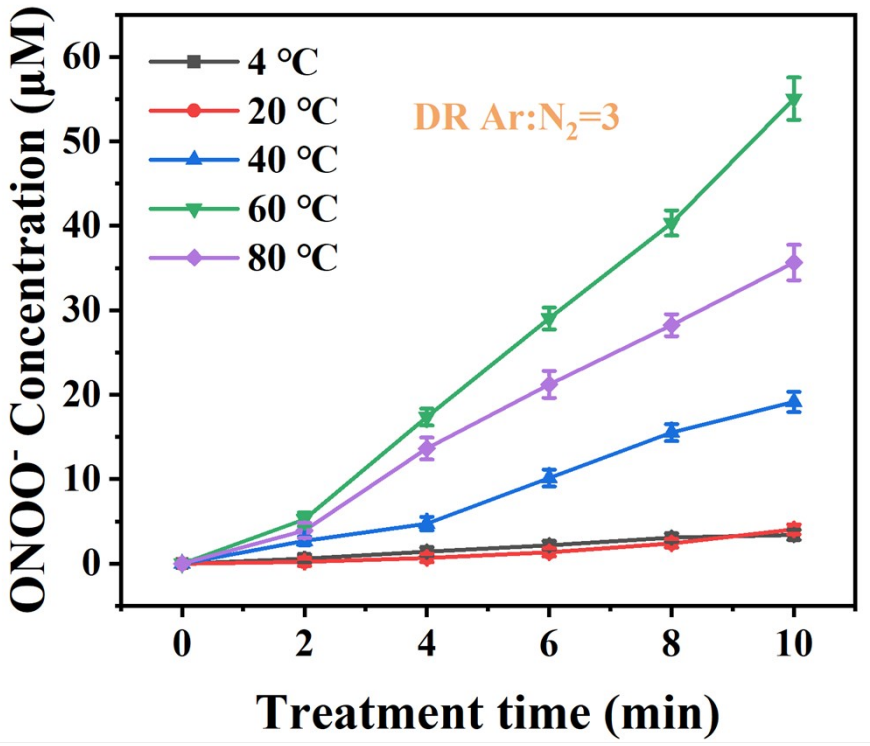

Fig. S23 The concentration of ONOO- curve DR-PAW with treatment time at various temperature.

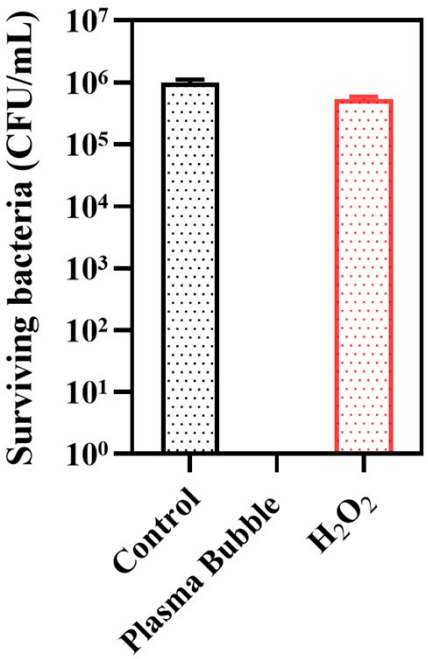

Fig. S24 Bactericidal effect of PAW produced from the DR system. Control refers to maintaining other conditions (including bacterial concentration, volume, temperature, etc.) but not using plasma treatment; Plasma bubble refers to maintaining other conditions (including bacterial concentration, volume, temperature, etc.) and using plasma treatment H_2O; H_2O_2 refers to maintaining other conditions (including bacterial concentration, volume, temperature, etc.), but adding same concentration of H_2O_2 to the water and not using plasma treatment.