

Supporting information

SF₆ degradation in a γ -Al₂O₃ packed DBD system: Effects of hydration, reactive gases and plasma-induced surface charges

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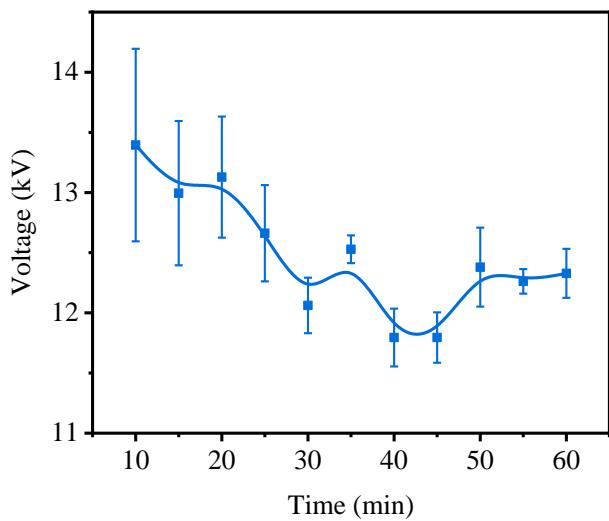
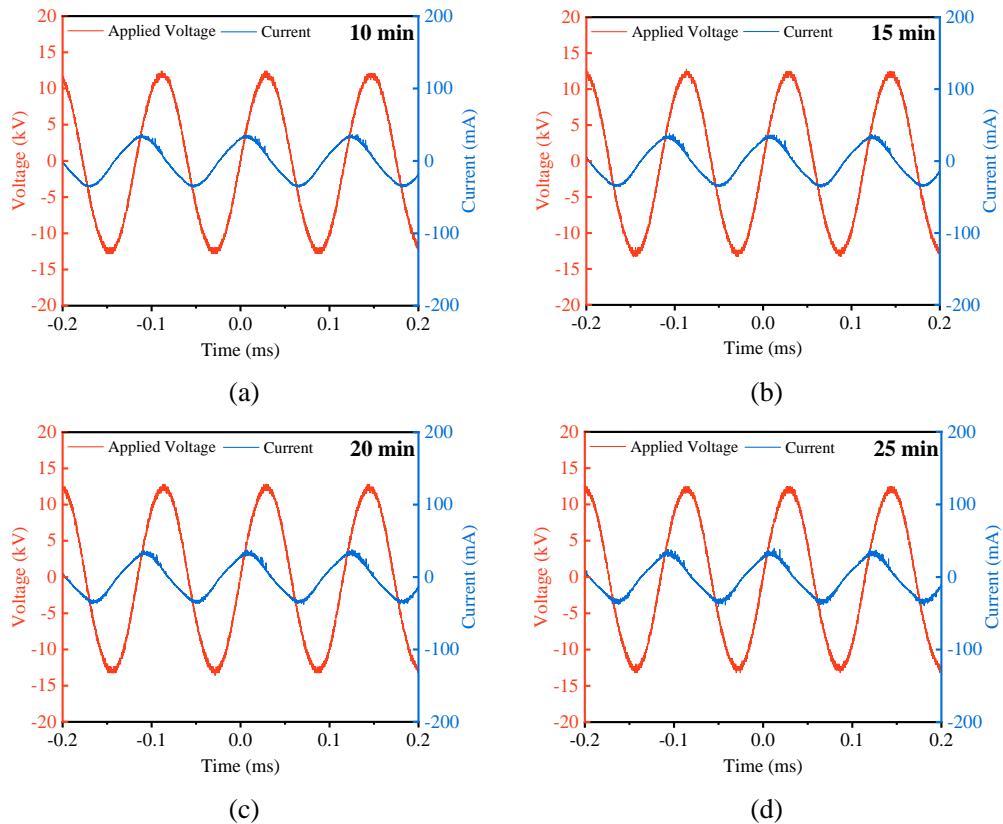


Fig. S1 1-hour temporal evolution of the voltage amplitude in the Ar discharge. (80 W, 2mm hydrated $\gamma\text{-Al}_2\text{O}_3$ packing)



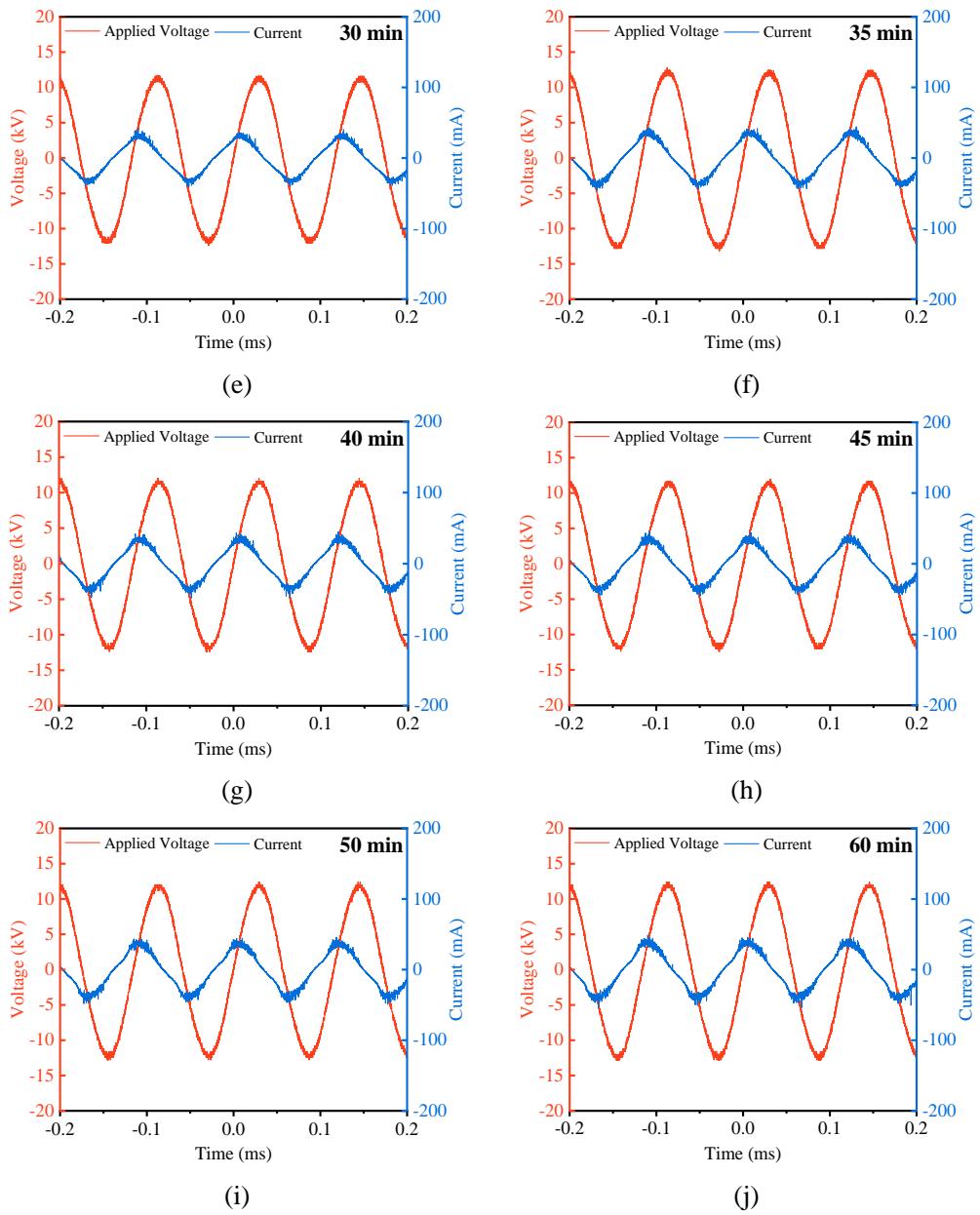


Fig. S2 U-I signals during 1-hour temporal discharge test. (80 W, 2mm hydrated γ -Al₂O₃ packing)

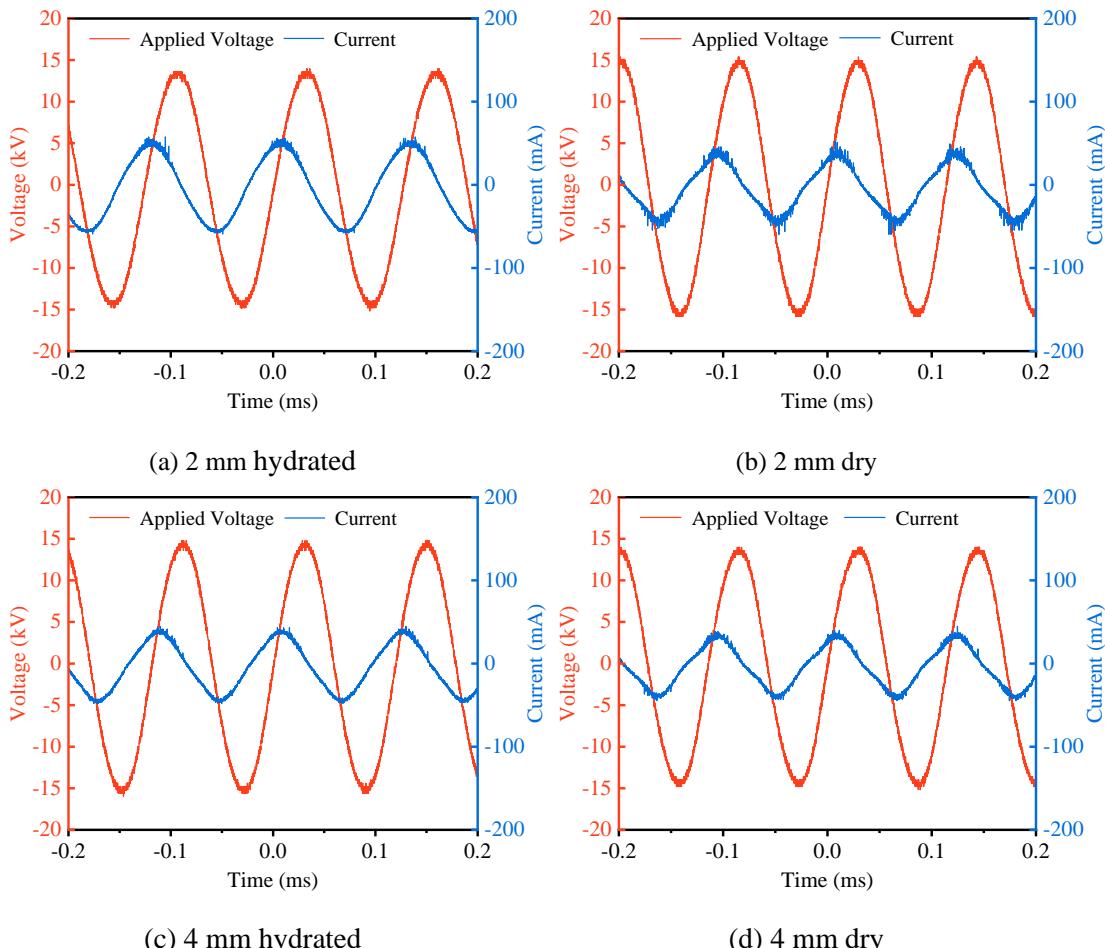


Fig. S3 Discharge voltage and current signals of two packing systems before and after the hydration (3% SF₆-97% Ar, input power: 100W)

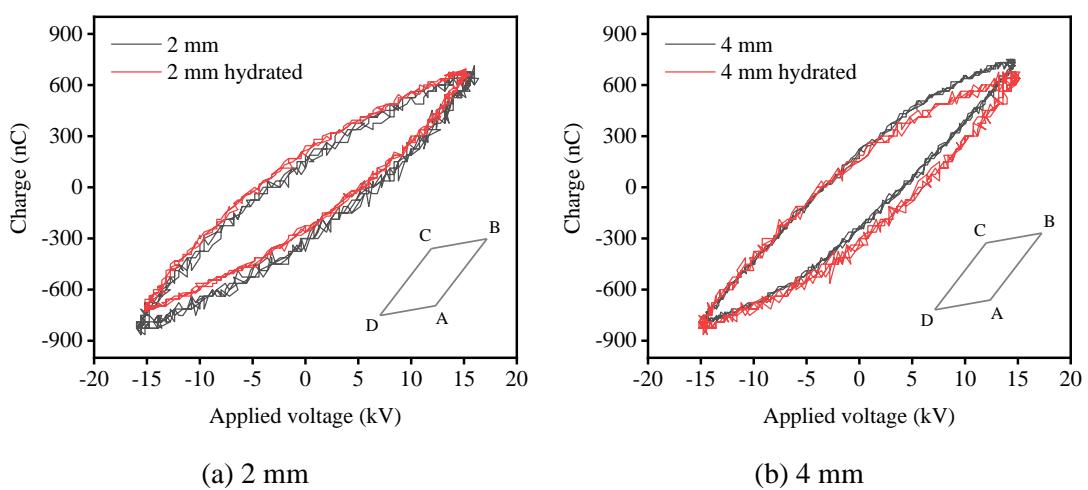


Fig. S4 Q-V plots of the γ -Al₂O₃ packing systems before and after the hydration process (3% SF₆-97% Ar, 100 mL/min, 100 W)

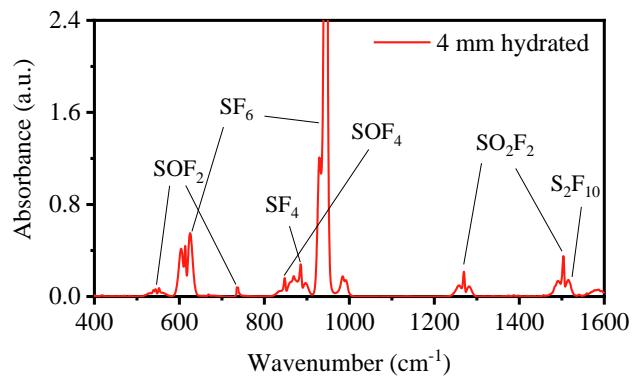


Fig. S5 FTIR results of the gas mixture after the DBD abatement with hydrated $\gamma\text{-Al}_2\text{O}_3$ packing
(4 mm beads, 3% SF₆ - 97% Ar, 100 mL/min, 80 W)

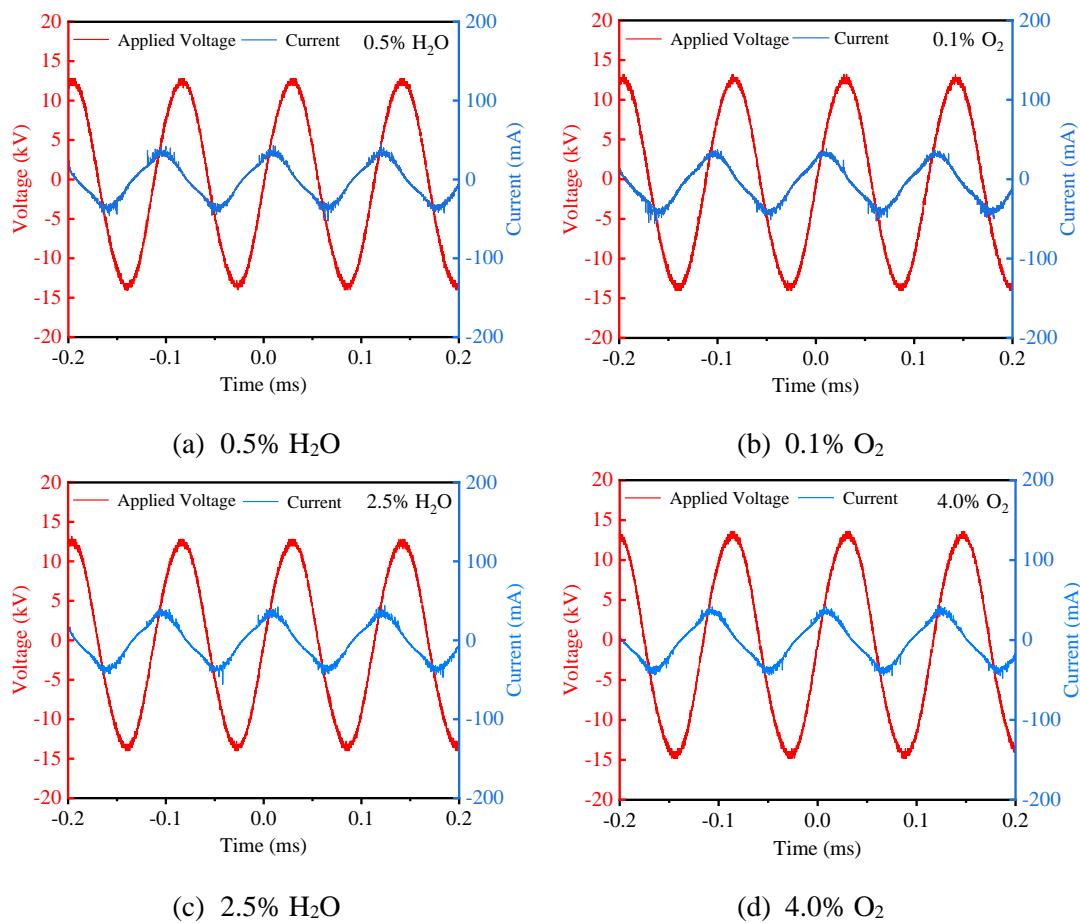


Fig. S6 Discharge voltage and current signals of the packed bed system with H₂O or O₂ additions
(80 W, 200 mL/min, 3% SF₆, 4 mm $\gamma\text{-Al}_2\text{O}_3$ packing)

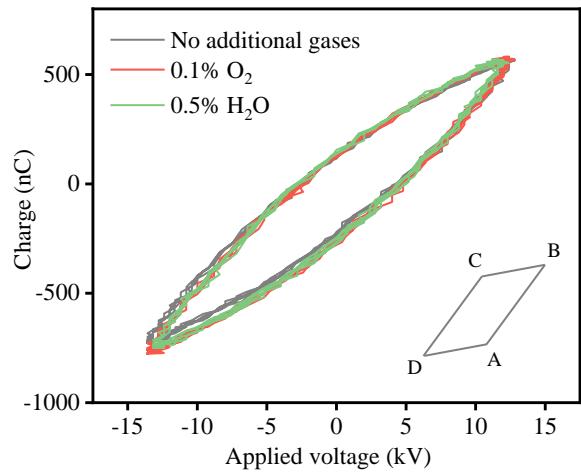


Fig. S7 Q-V plots for the packed bed systems with and without additional gases (80 W, 200 mL/min, 3% SF₆, 4 mm γ -Al₂O₃ packing)

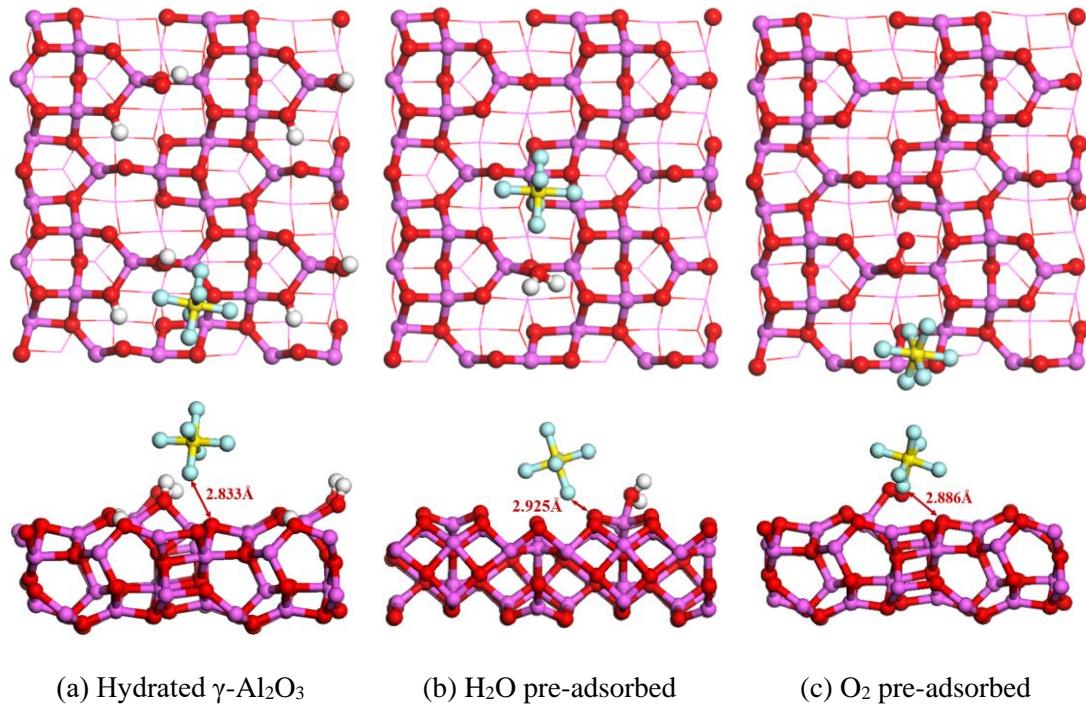


Fig. S8 SF₆ adsorption on three surfaces with the Al_{III} site occupied by pre-adsorbed species

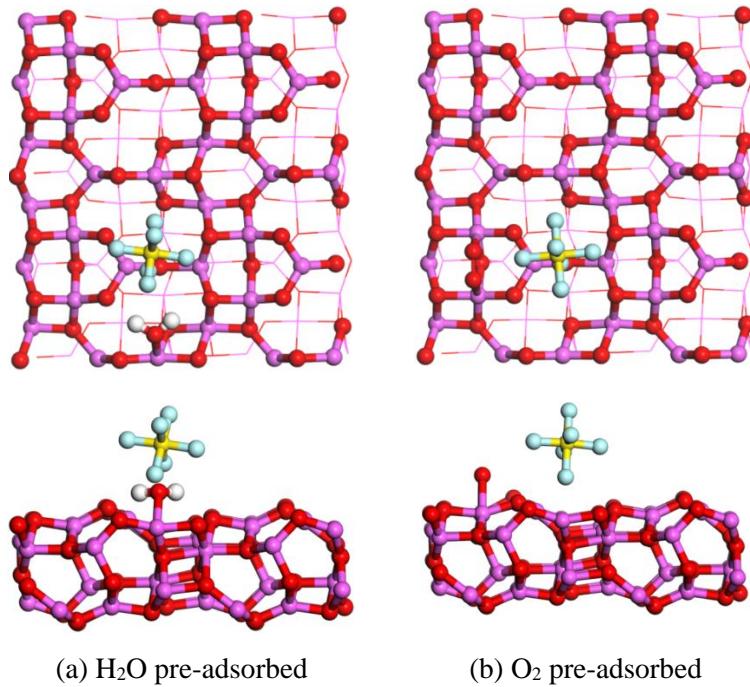


Fig. S9 SF₆ adsorption on H₂O or O₂ pre-adsorbed surface with SF₆ adsorbed at the Al_{III} site

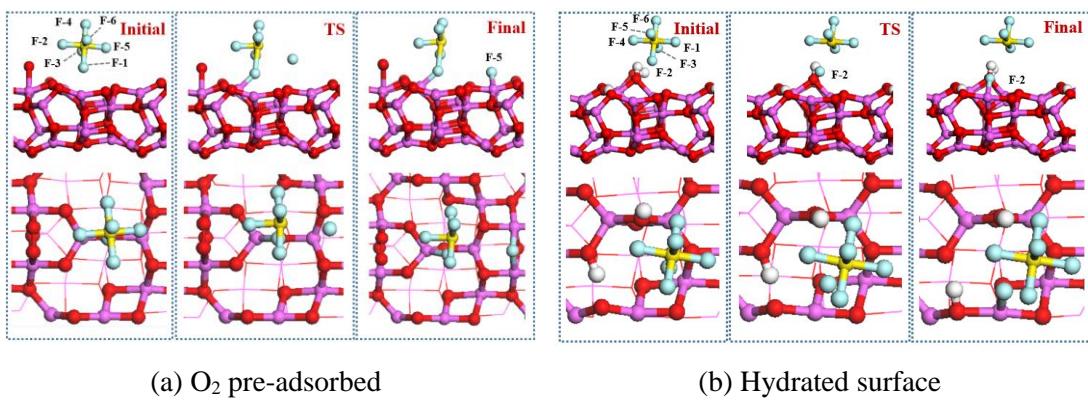


Fig. S10 TS process of SF₆ initial bond breaking on the O₂ pre-adsorbed and hydrated surfaces

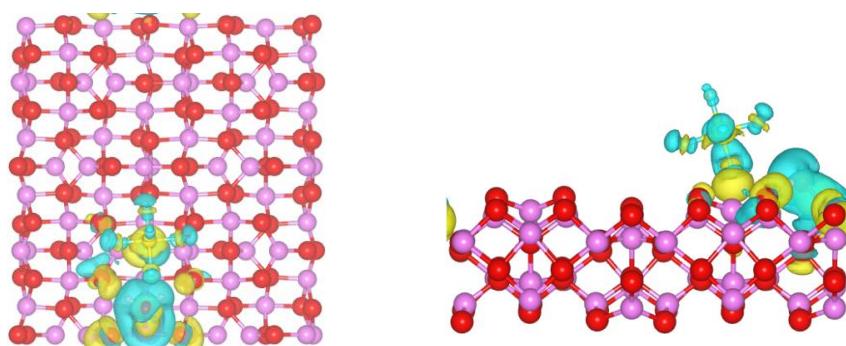


Fig. S11 The differential charge distribution of SF₆ on H₂O pre-adsorbed γ -Al₂O surface. The yellow region indicates an increase in charge density and the cyan region indicates a decrease.

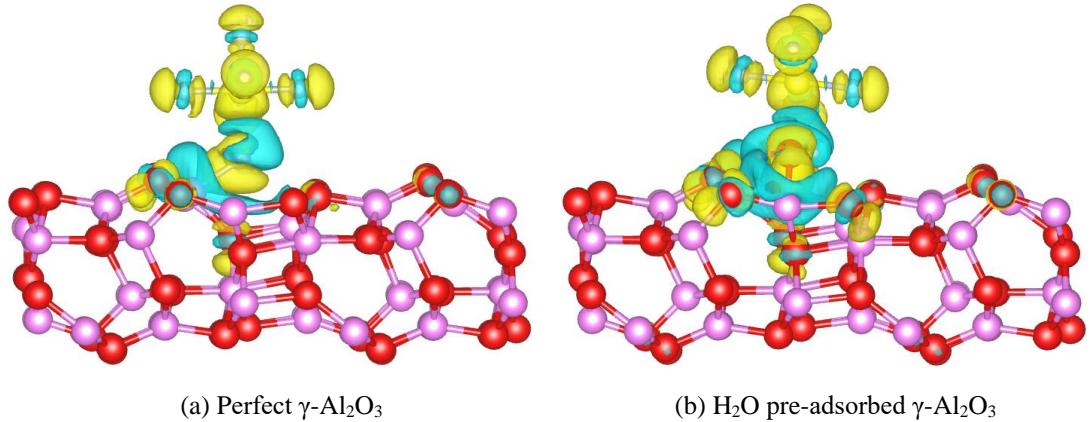


Fig. S12 The differential charge distribution of SF_6 adsorbed on the two surfaces with $1.00|e|$ induced surface charges. The yellow region indicates an increase in charge density and the cyan region indicates a decrease.

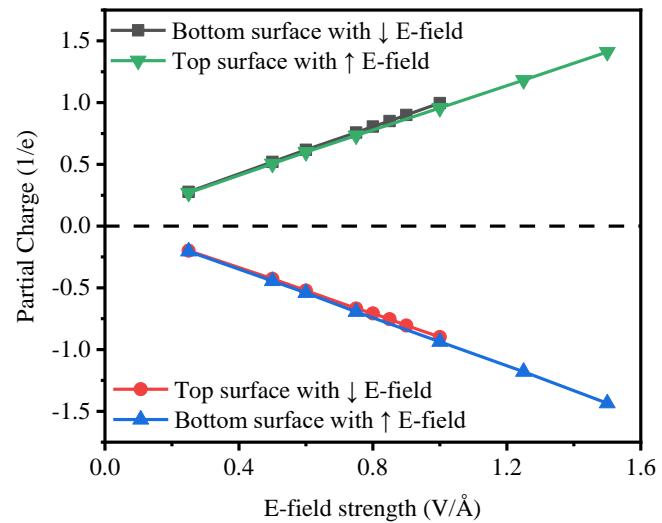


Fig. S13 Aggregated surface partial charge of the perfect $\gamma\text{-Al}_2\text{O}_3$ slab as a function of the electric field strength

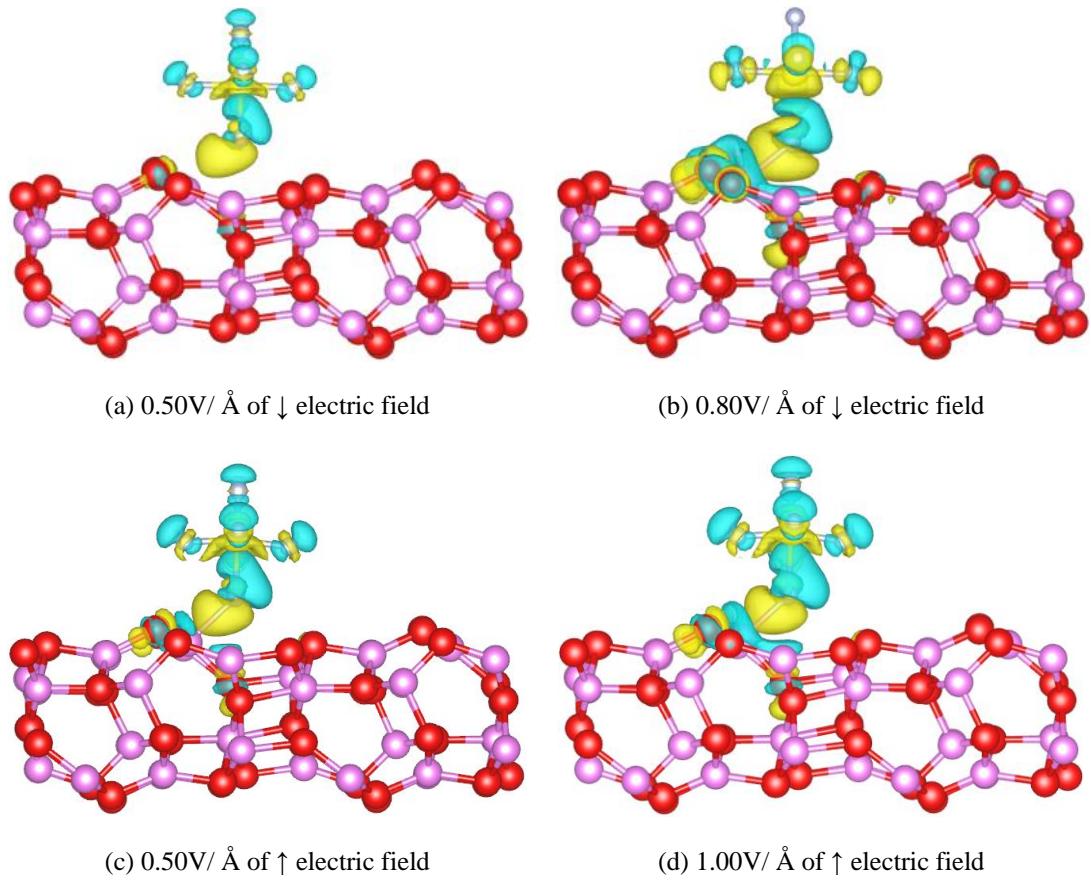


Fig. S14 Differential charge distributions for SF_6 adsorption configurations on the perfect $\gamma\text{-Al}_2\text{O}_3$ surface under different electric field strengths. The yellow region indicates an increase in charge density and the cyan region indicates a decrease.