# Supporting Information for

## Water Exotic States are Responsible for Hydrovoltaic Effect and Controllable Evaporation Over Carbon Fibers - Spectroscopic and Thermodynamic Studies

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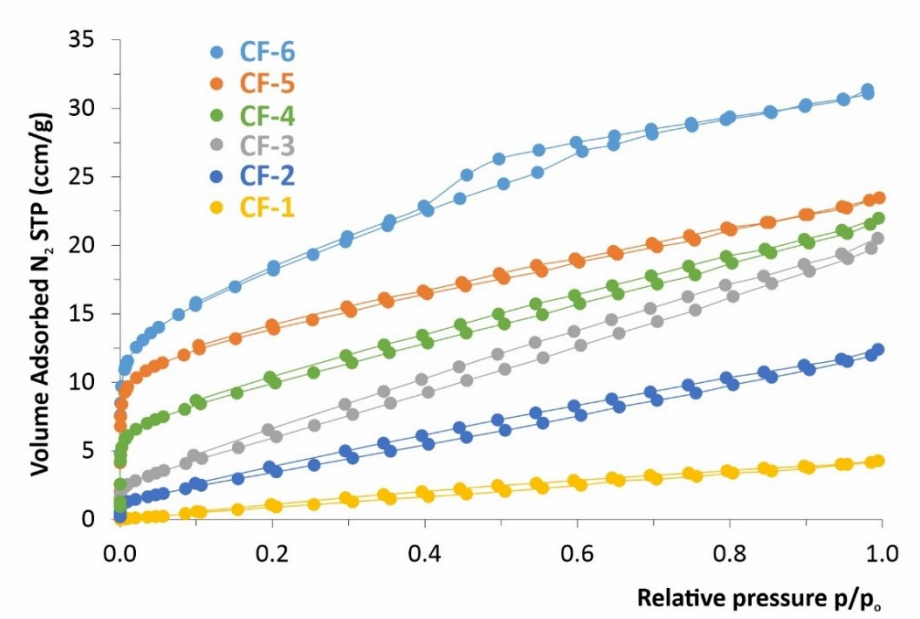



Figure S1. Low temperature $N_2$ adsorption isotherms of the tested samples. As expected, the sorption capacities increase in parallel with the increasingly oxidizing conditions. Nevertheless, the obtained surface areas do not exceed 25 $m^2/g$.

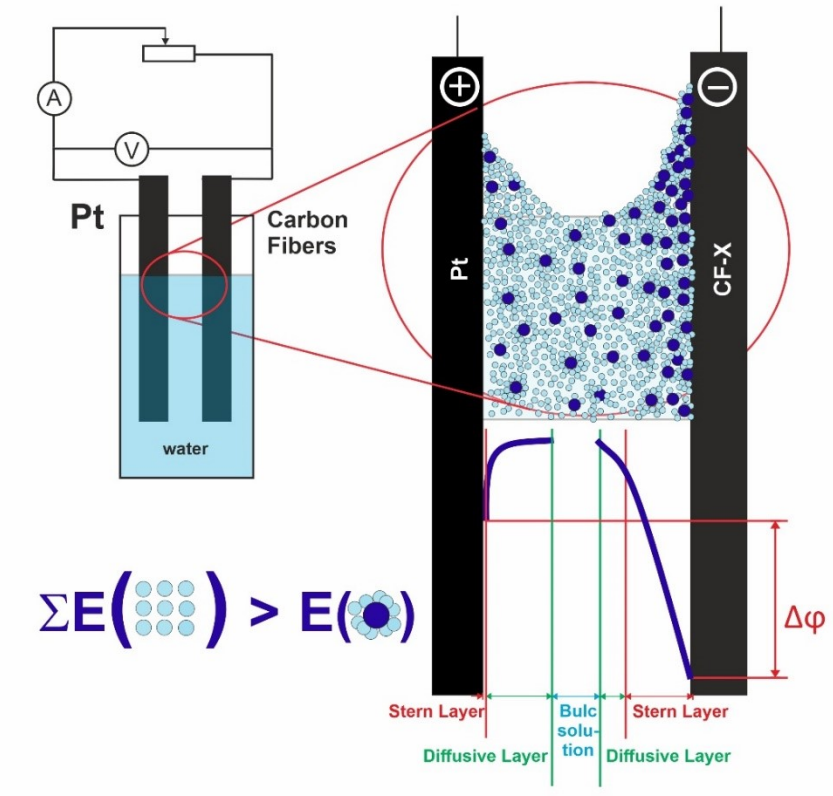



Figure S2. The scheme of the experimental device. The proposed mechanism of the hydrovoltaic effect is also schematically shown. By assumption, the sum of the energies of water molecules is greater than the total energy of the cluster formed from them, which triggers the formation of a stable Stern layer.

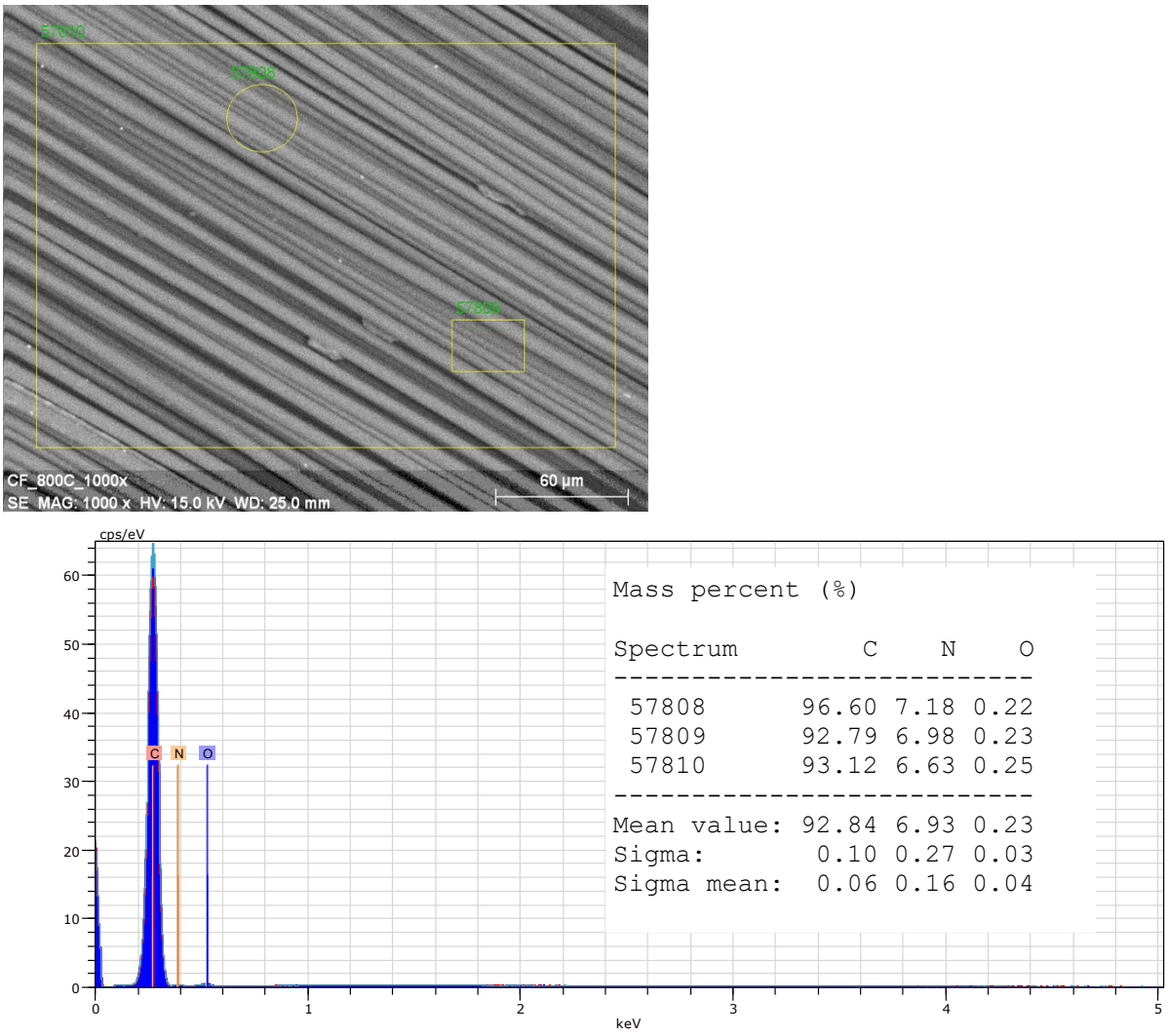
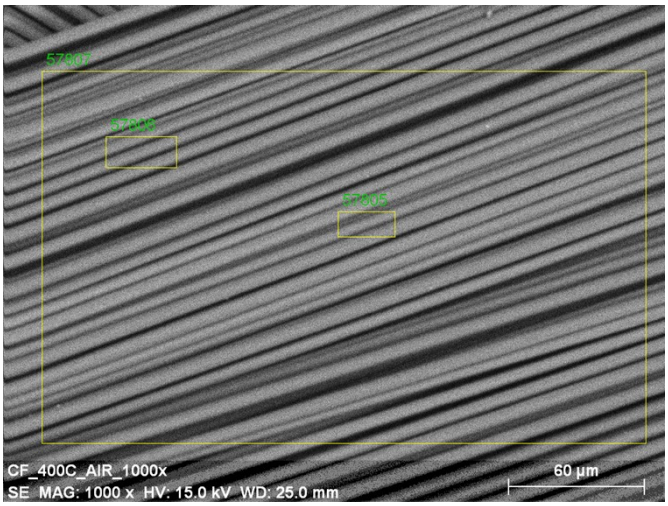



Figure S3. The EDX results for CF-1 sample.



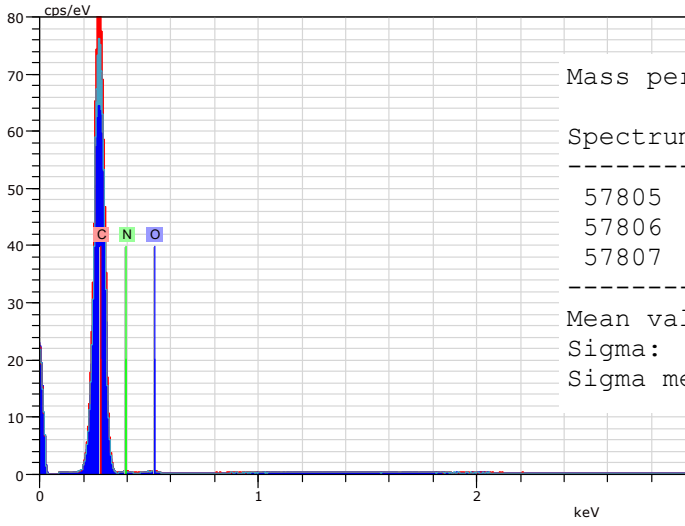




Figure S4. The EDX results for CF-6 sample

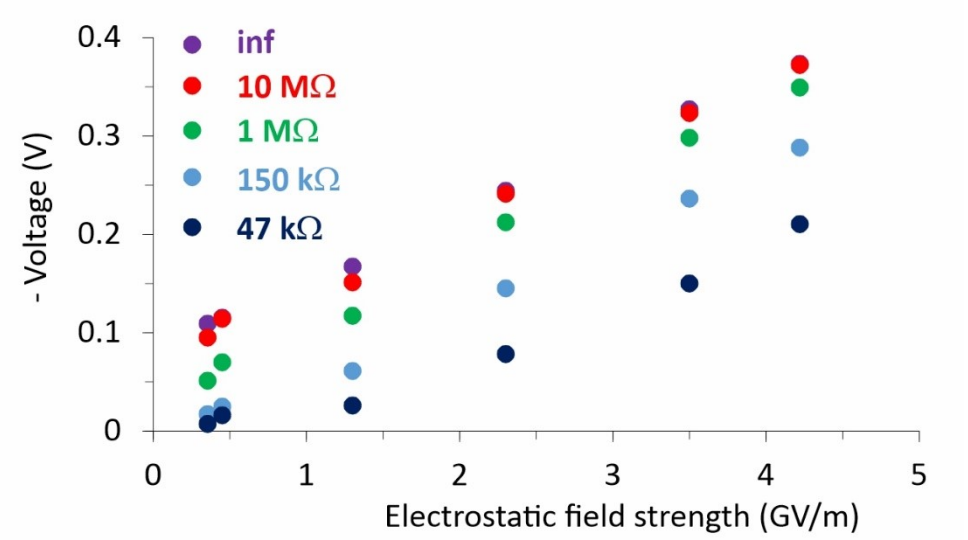



Figure S5. The hydrovoltaic potential dependence on the electrostatic field strength.

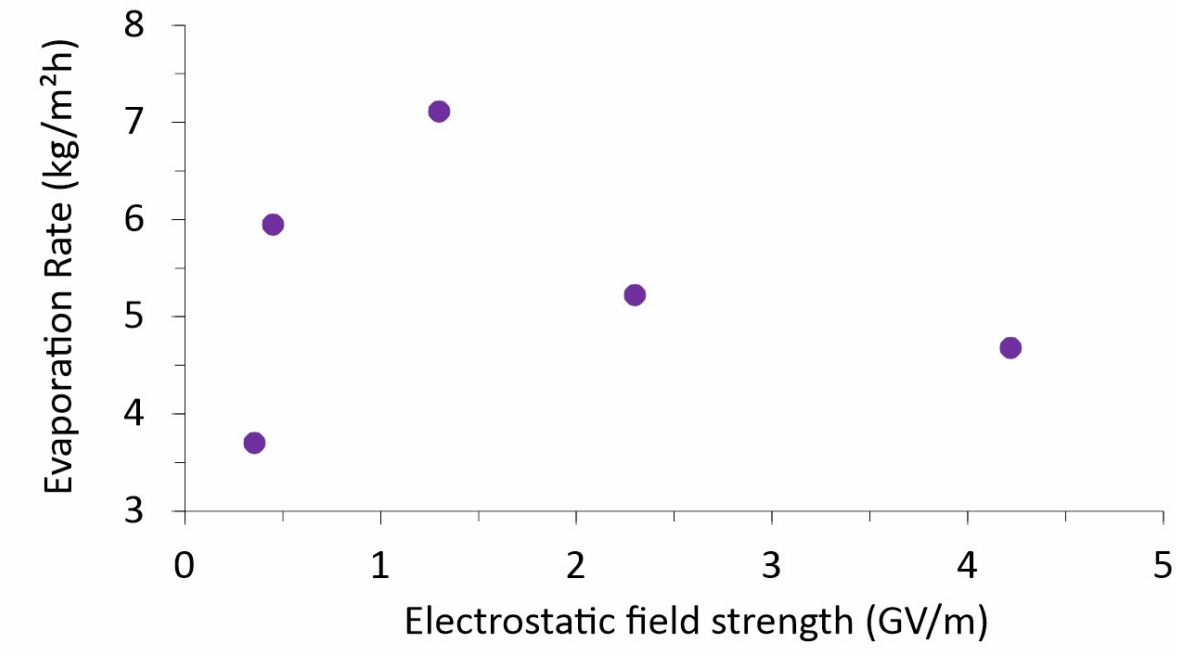



Figure S6. The evaporation rate dependence on the electrostatic field strength.

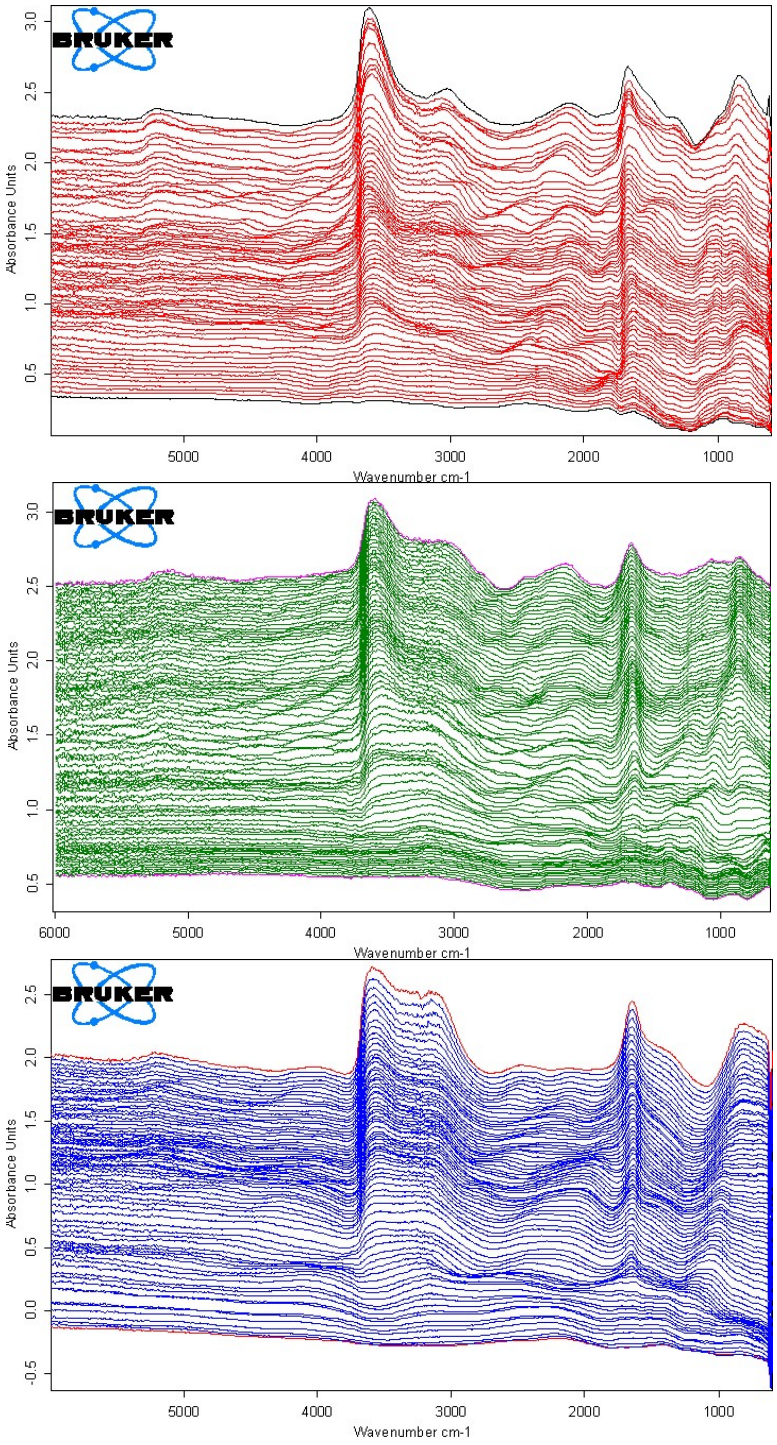



Figure S7. Time-resolved FTIR spectral changes registered during $H_2O$ evaporation from the CF surface: A – CF-1, B: CF-3, C: CF-6. Note that each spectrum was taken every 60 s. The background was the spectrum of the dry sample before immersion in $H_2O$.

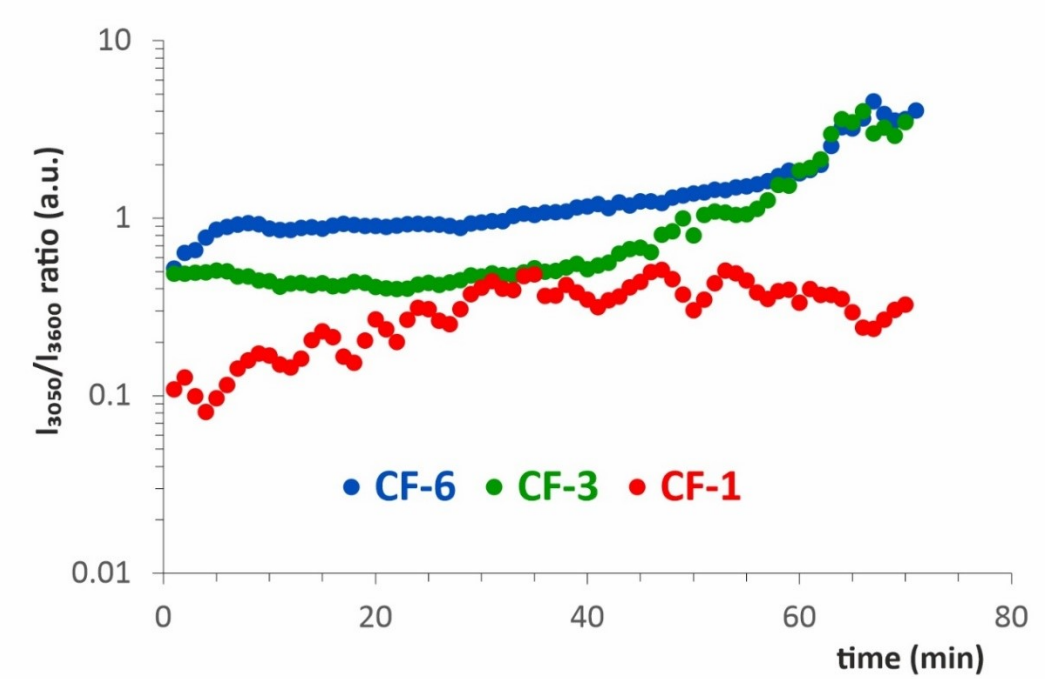



Figure S8. Changes in the ratio of the 3050/3600 $cm^{-1}$ bands intensities. The parameter allows fast and easy recognition of hydrogen bonds.

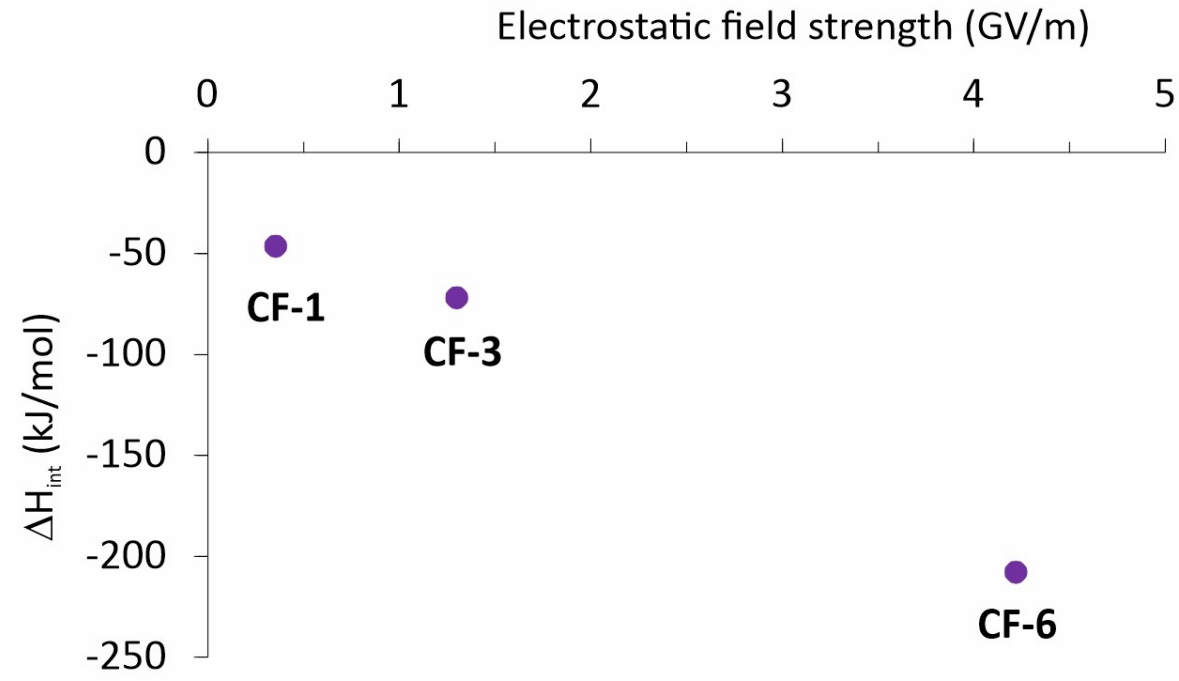



Figure S9. Dependence of the total enthalpy of adsorption on electrostatic field strength.

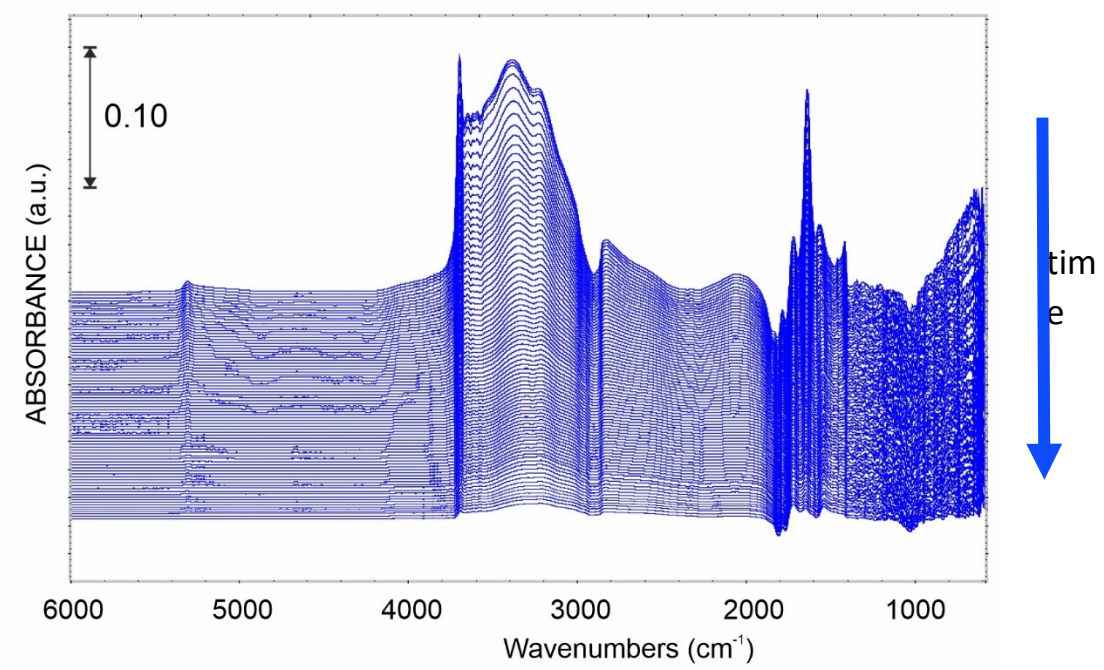



Figure S10. Time-resolved FTIR spectral changes registered during $H_2O$ evaporation from the nanodiamond surface: Note that each spectrum was taken every 30 s. The background was the spectrum of the dry sample before immersion in $H_2O$.

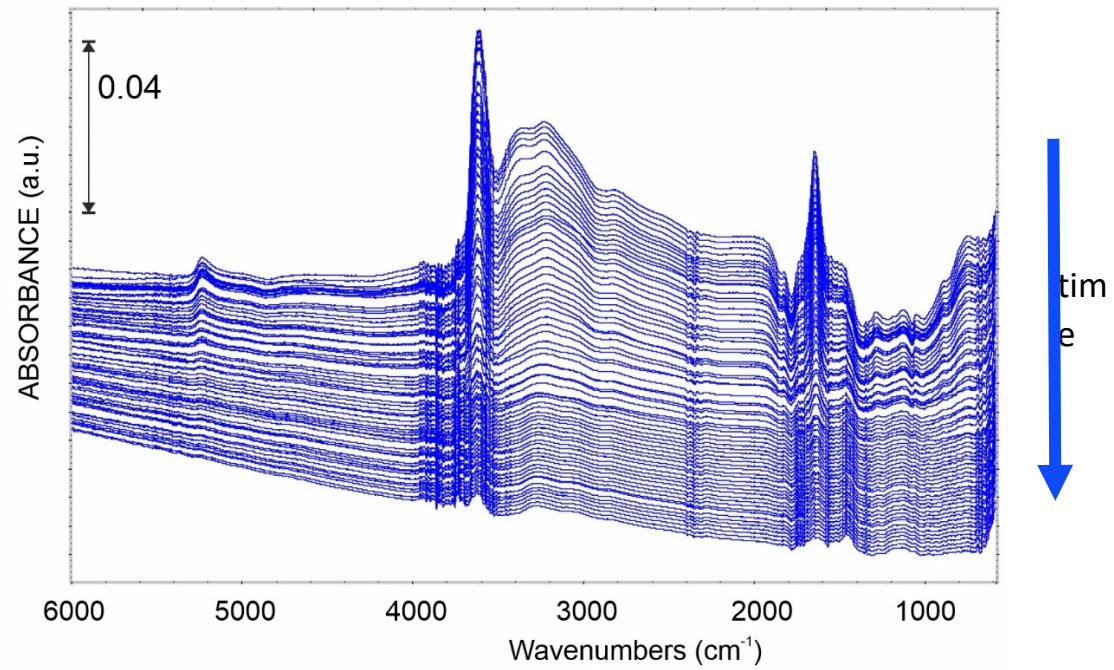



Figure S11. Time-resolved FTIR spectral changes registered during $H_2O$ evaporation from the graphene oxide surface: Note that each spectrum was taken every 30 s. The background was the spectrum of the dry sample before immersion in $H_2O$.

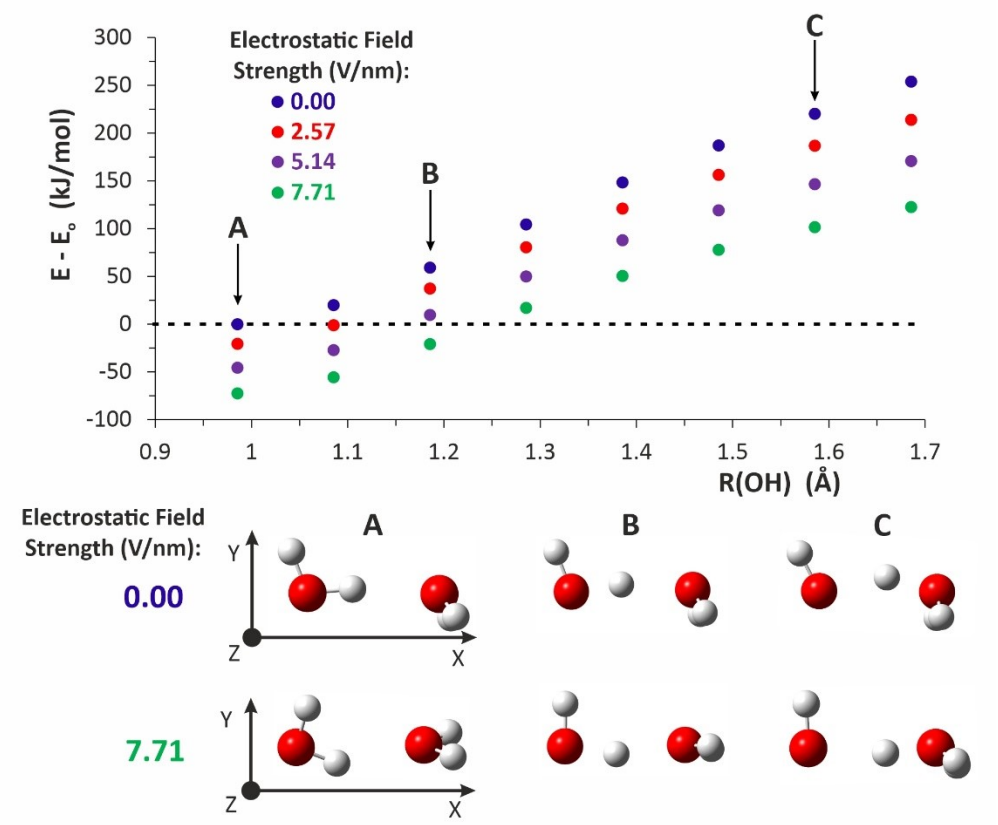



Figure S12. The effect of the electrostatic field strength on the energy of a 2-molecular water system during the dissociation process. Note that the electrostatic field is parallel to the X axis.