Electronic supplementary information

Surface chemistry of water-dispersed detonation nanodiamonds modified by atmospheric DC plasma afterglow

Pavla Stenclova,*a Vladyslava Celedova,b Anna Artemenko,a Vit Jirasek,a Jaroslav Jira,a,b Bohuslav Rezek,b and Alexander Kromka,a

a Institute of Physics, Academy of Sciences of the Czech Republic, Cukrovarnicka 10, 162 00 Prague 6, Czech Republic.
b Faculty of Electrical Engineering, Czech Technical University in Prague, Technicka 2, 166 27 Prague, Czech Republic

E-mail: stenclova@fzu.cz
Fig. S1. FTIR spectra of asrec-DND and O-DND samples treated by corona and transient spark discharge afterglow. The spectra are obtained before drying in vacuum, samples were dried only on a hotplate prior to FTIR measurement. The spectra are normalized at carbonyl peak at 1720 cm\(^{-1}\) (1795 cm\(^{-1}\) for O-DND, respectively), which is stable in XPS. The spectra are stacked in the graphs for better clarity.
Fig. S2. Raman spectra of presented materials. Spectra are normalized at a D-peak centered at 1325 cm$^{-1}$. Hardly any difference is resolvable. Modification of all treated DNDs thus occurs on their surfaces with minimal impact on their core.
Fig. S3. Deconvoluted C 1s peak from XPS spectra.
Fig. S4. The water contribution was estimated from deconvolution of O 1s peaks. The O 1s peaks were fitted into 4 peaks: 531.1 eV C=O, 532.3 eV C−O, 533.3 eV C−OH, and 534.7 eV O in H$_2$O. The results of the O 1s fits show that the samples had maximally 2% of water and that as-received DNDs with hydrogen-related groups on the surface binds more water. The amount of water and difference between as-received and oxidized DNDs is in a good agreement with thermogravimetric analysis of DNDs in our prior work.\(^2\)

Fig. S5. The high resolution C 1s spectrum and chemical composition from XPS analysis on bare Au substrate evidencing some contamination by carbon but no band at 282.7 eV specific to O-DND.

### References