**Supporting Information**

# Heterogeneous photoactive antimicrobial coating based on a fluoroplastic doped with an octahedral molybdenum cluster compound

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# Content

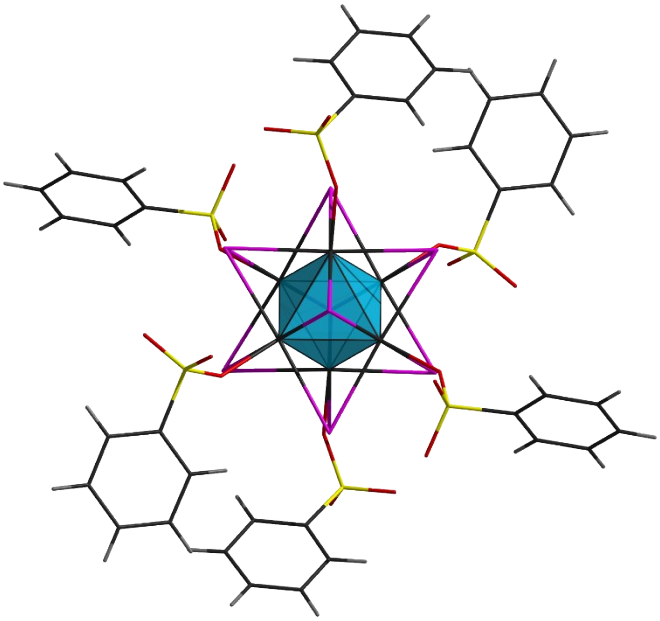

**Figure S1**. Crystal structure of $(Bu_4N)_2[\{Mo_6I_8\}(OTs)_6]$ (**1**).[1] Color coding: $Mo_6$ (octahedron), iodine (magenta), oxygen (red), sulfur (yellow), carbon (dark gray), hydrogen (light grey).

## ICP-AES data

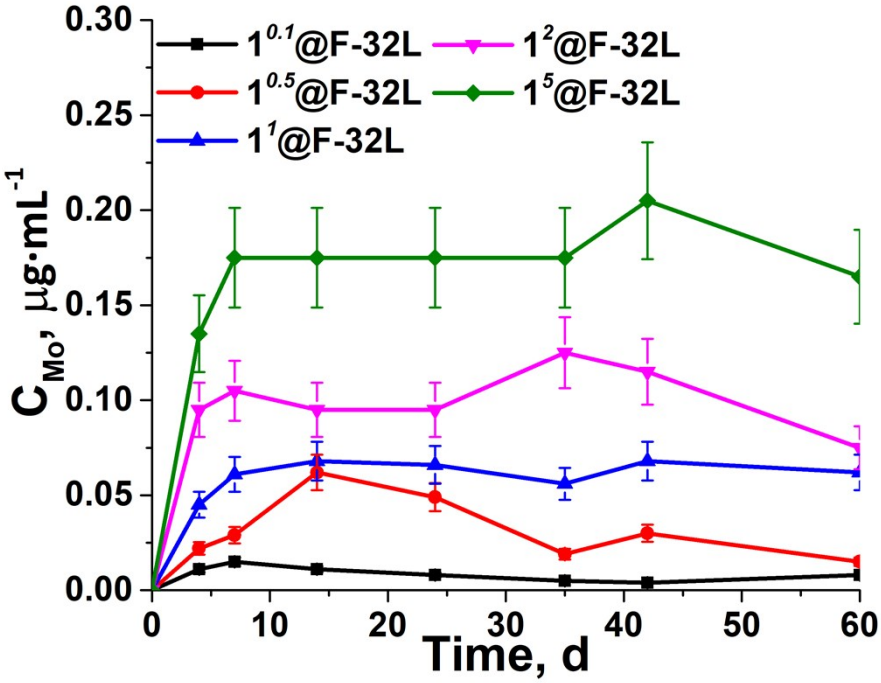


**Figure S2**. Amount of Mo leached from the **1**$^{n}$@F-32L films vs. soaking time obtained by ICP-AES.

**Table S1**. Mass of Mo leached from the **1**$^{n}$@F-32L films soaked for 60 days obtained by ICP-AES.

| Sample | Mass of Mo leached, μg | % of cluster leached |
|---|---|---|
| **1**$^{0.1}$@F-32L | 0.81 | 8.8 |
| **1**$^{0.5}$@F-32L | 1.7 | 3.8 |
| **1**$^{1}$@F-32L | 6.2 | 6.7 |
| **1**$^{2}$@F-32L | 7.9 | 4.3 |
| **1**$^{5}$@F-32L | 16.6 | 3.6 |

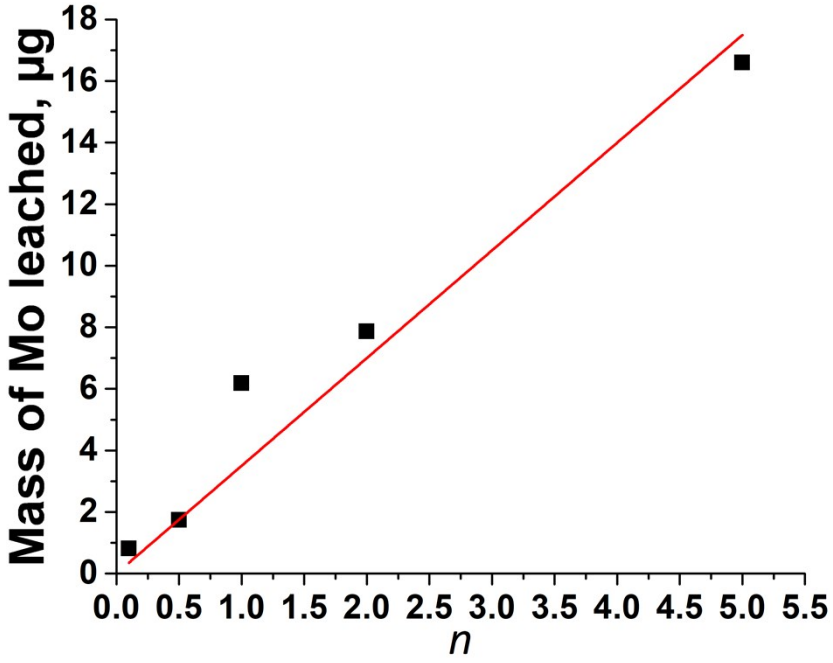


**Figure S3**. Mass of Mo leached from **1**$^{n}$@F-32L soaked for 60 days vs. cluster content *n*.

## SEM images

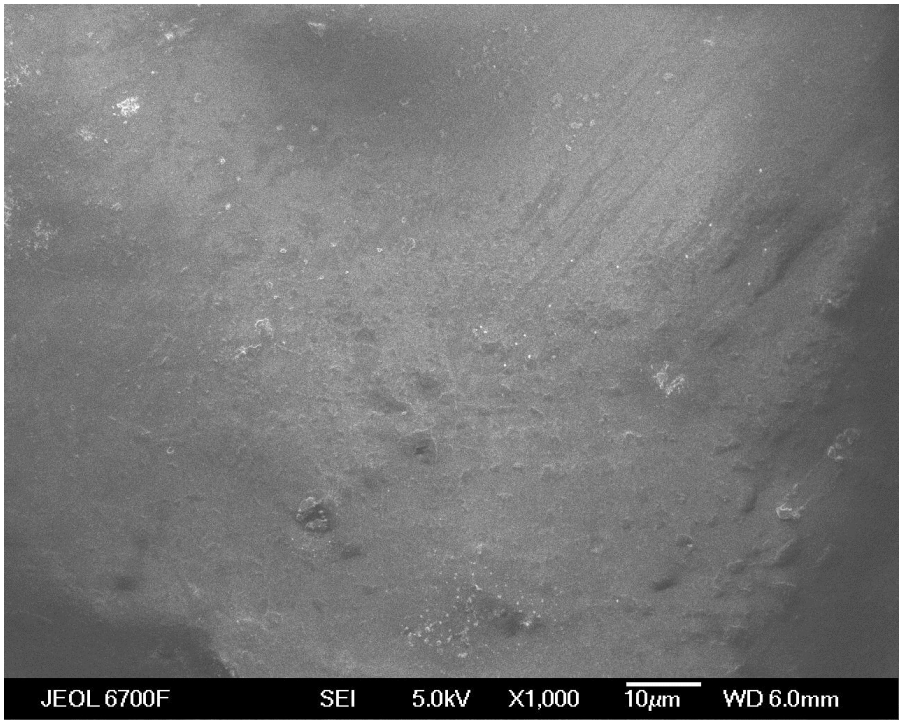


**Figure S4**. Scanning electron microscopy image of the F-32L film.

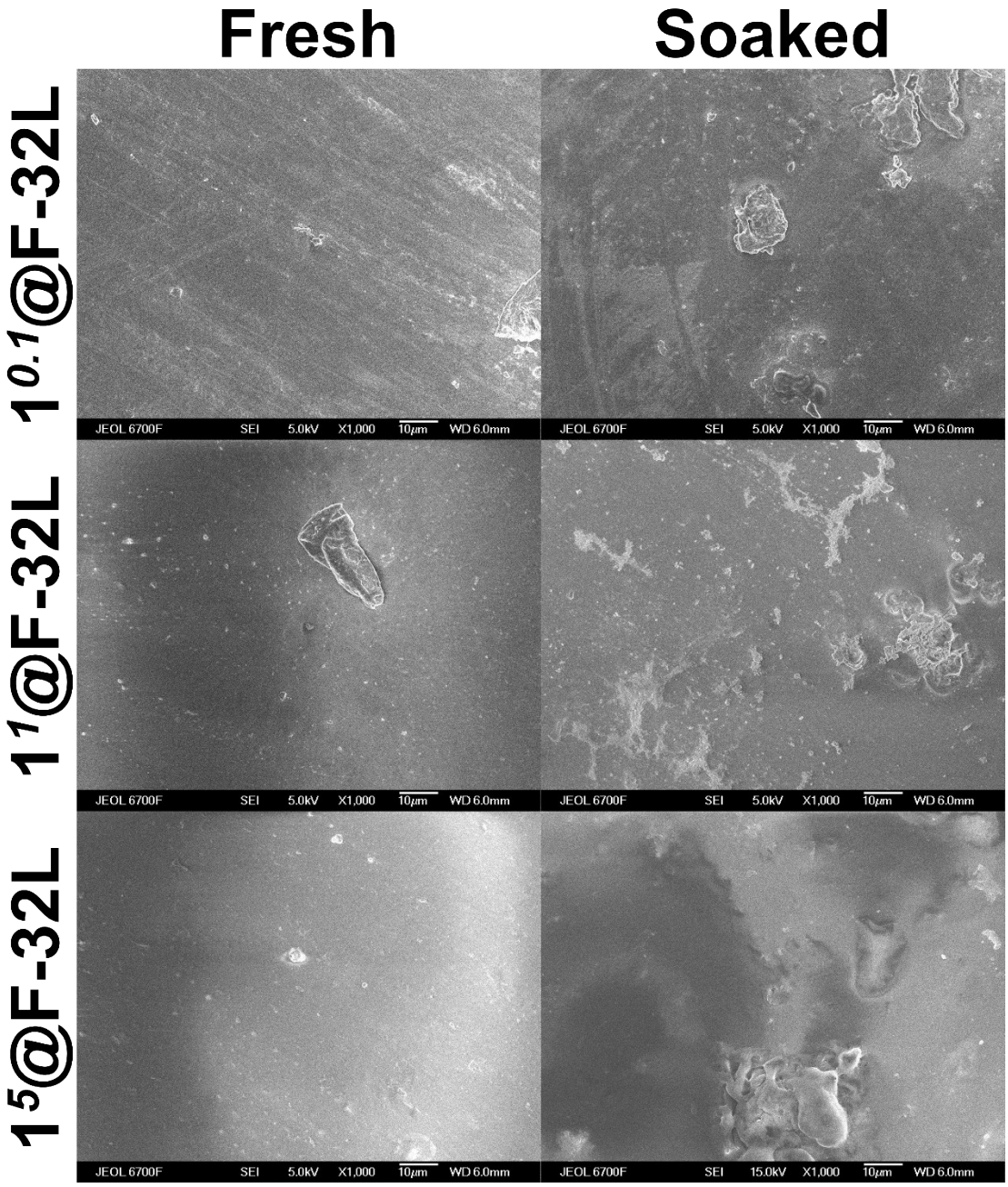


**Figure S5**. Scanning electron microscopy images of fresh **1**$^{n}$@F-32L films (left) and the same films soaked for 60 days (right).

## CLSM images

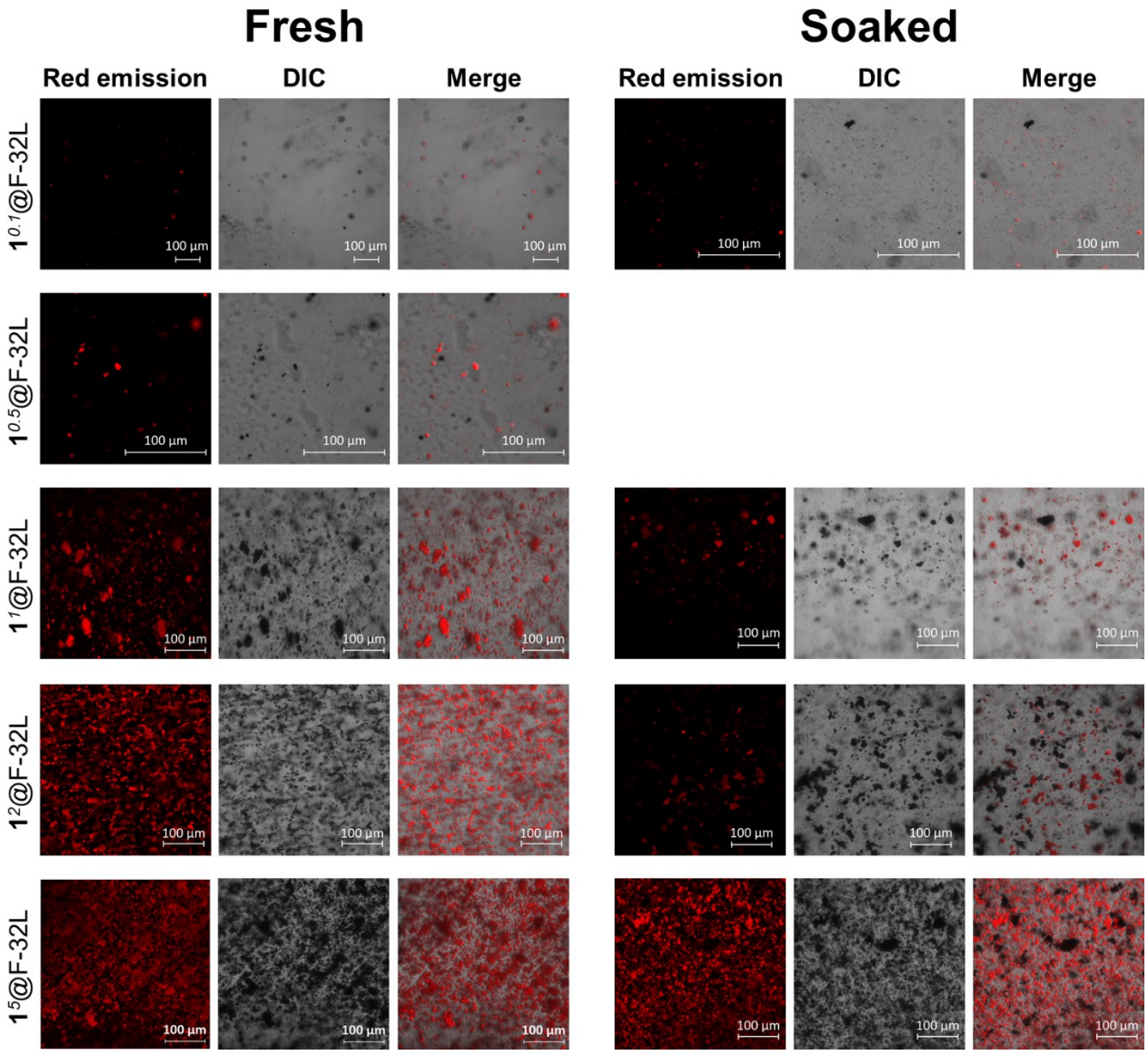


**Figure S6**. Confocal laser scanning microscopy images of fresh and soaked (for 60 days) **1**$^{n}$@F-32L films, scale 100 µm. Phosphorescence emission was collected at 680 nm after 405 nm excitation, DIC is differential interference contrast, merging of both measurements is on the right of each column.

## $\Phi_L$ values vs cluster content and excitation spectra of the films

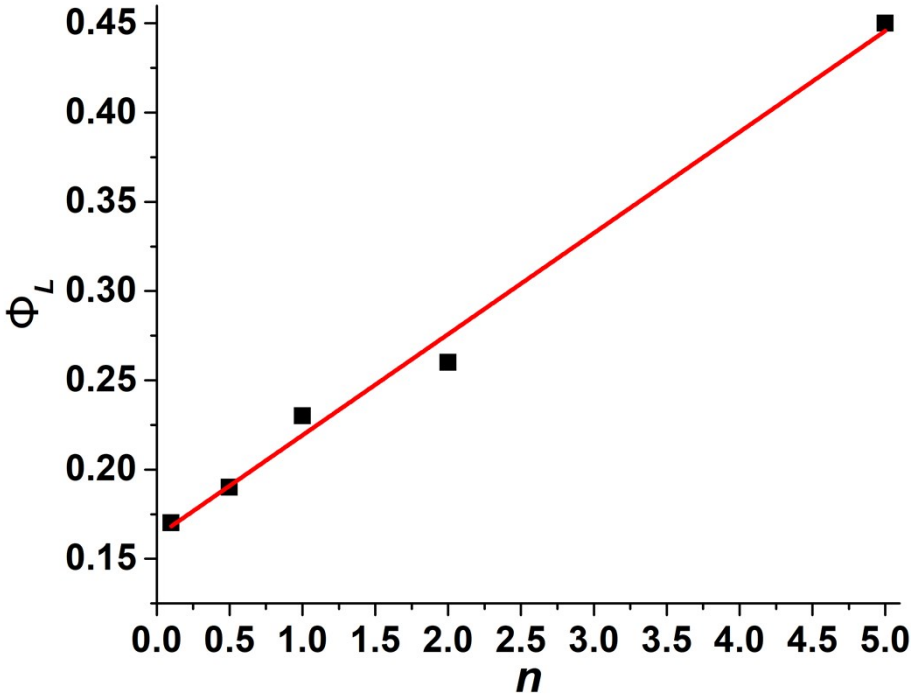


**Figure S7**. Phosphorescence quantum yields $\Phi_L$ of the $\mathbf{1}^n$@F-32L films vs. cluster content *n*. Based on the data given in Table 2.

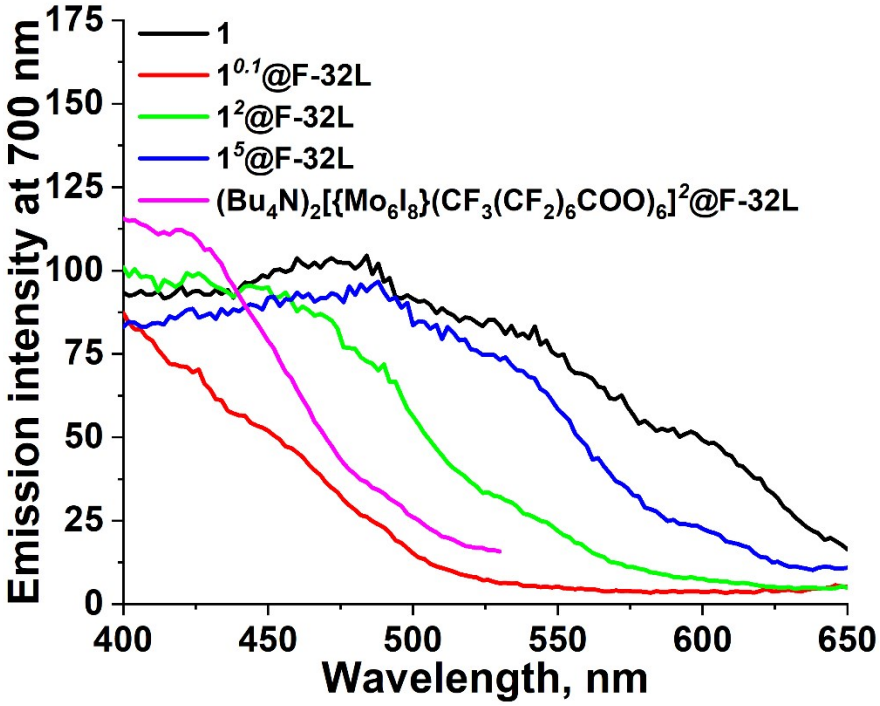


**Figure S8**. Excitation spectra of **1** and $\mathbf{1}^n$@F-32L and $(Bu_4N)_2[\{Mo_6I_8\}(CF_3(CF_2)_6COO)_6]^2$@F-32L films. Emission recorded at 700 nm.

## Phosphorescence decay kinetics at different oxygen pressures

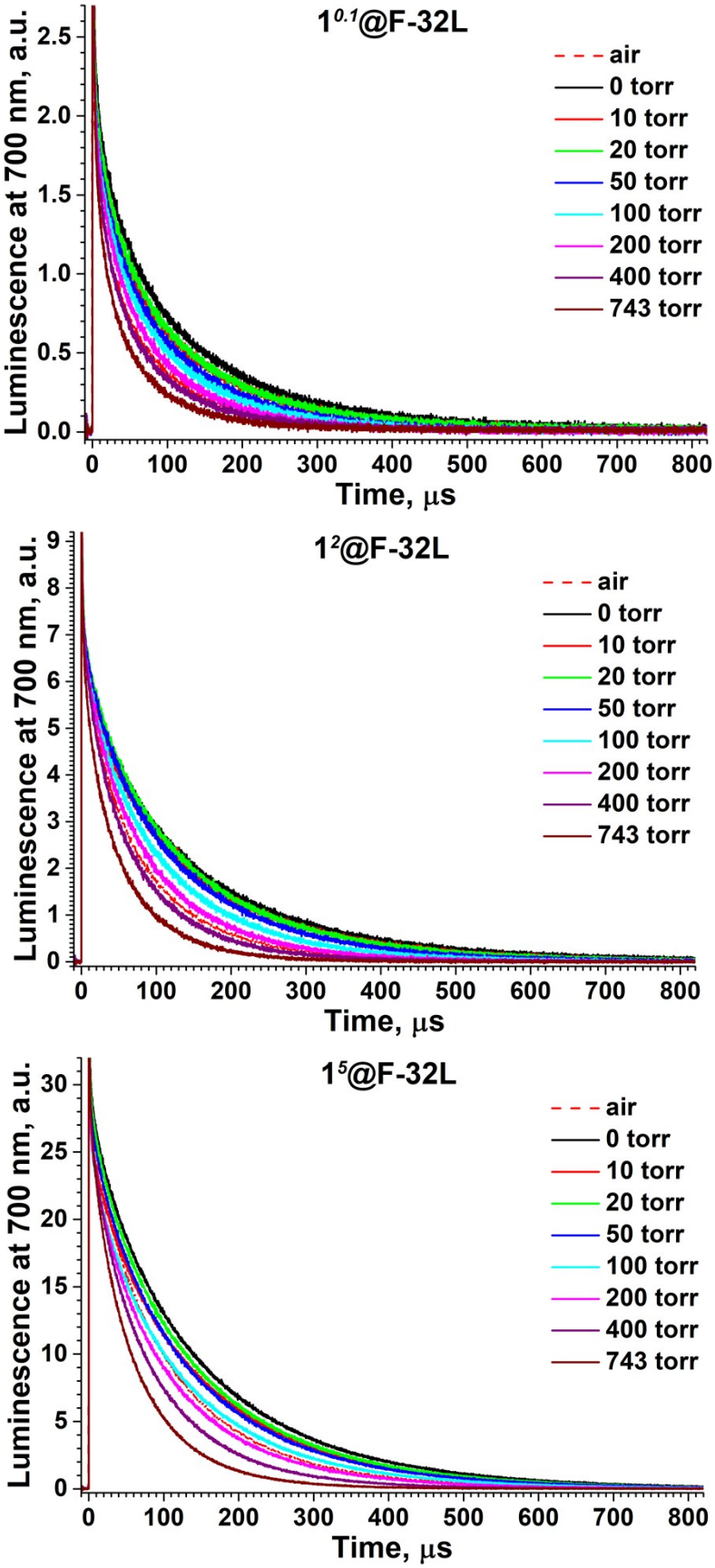


**Figure S9**. Phosphorescence decay kinetics at different oxygen pressures for the **1**$^{n}$@F-32L films. Phosphorescence was measured at 700 nm.

## DHN photooxidation in the presence of the films

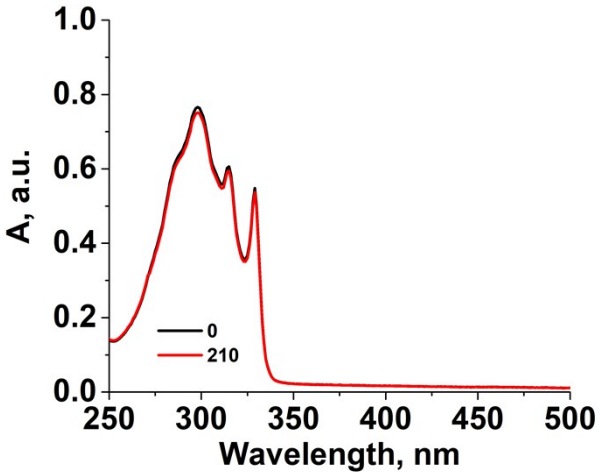


**Figure S10**. UV-vis spectra of 1,5-dihydroxynaphthalene (DHN) in water under 365 nm irradiation. Comparison of the starting spectrum (black) with the spectrum after 210 min irradiation (red) documents photochemical stability of DHN.

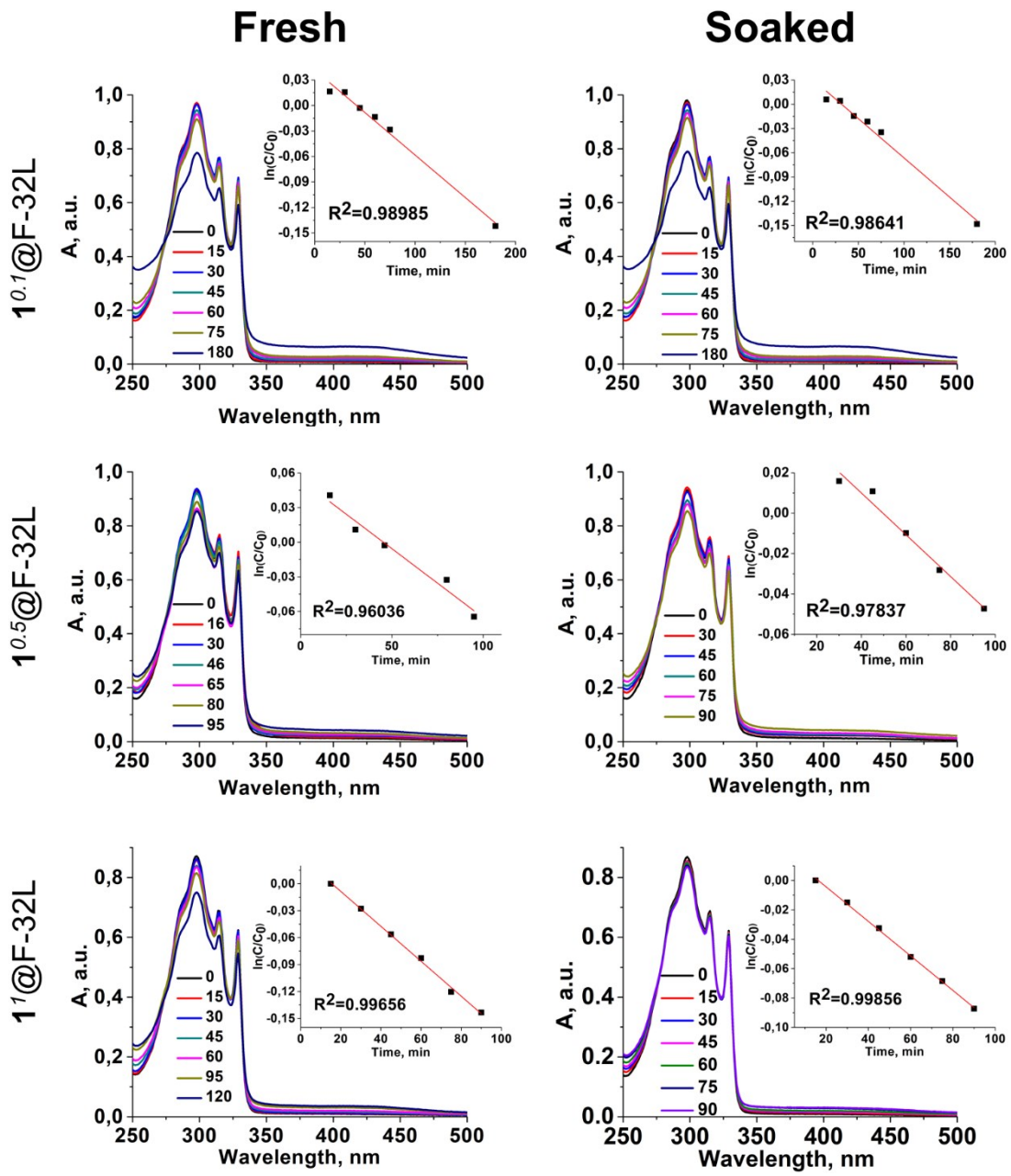


**Figure S11**. UV-vis spectra of the 1,5-dihydroxynaphthalene (DHN) photooxidation in the presence of the **1**$^{n}$@F-32L films ($n$ = 0.1, 0.5, 1) in water under 365 nm irradiation (*left* – fresh films, *right* – soaked films in water for 60 days). The inserts show linear plots of the $\ln(C/C_0)$ *vs* time dependence, where $C_0$ is the initial concentration of DHN.

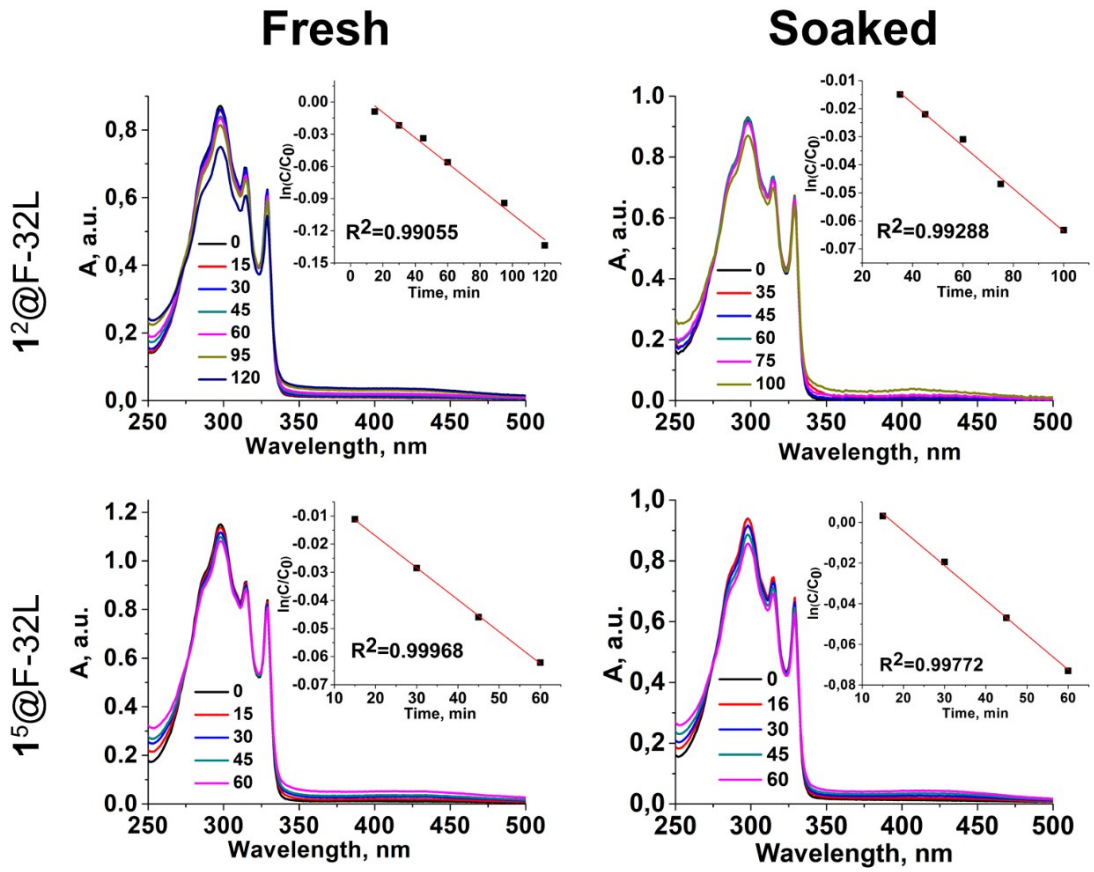


**Figure S12**. UV-vis spectra of the 1,5-dihydroxynaphthalene (DHN) photooxidation in the presence of the **1**$^{n}$@F-32L films ($n$ = 2, 5) in water under 365 nm irradiation (*left* – fresh films, *right* – films soaked in water for 60 days). The inserts show linear plots of the $\ln(C/C_0)$ *vs* time dependence.

## Antimicrobial activity

**Table S2.** Percentage of CFU in comparison to control experiments for fresh and soaked (60 days) films after irradiation with a white light source. The confidence interval is calculated for P=0.95. Control experiments were performed using neat F-32L films under the same conditions.

| Sample | *E. coli* (Gram-) | *S. aureus* (Gram+) | *S. typhimurium* (Gram-) | *PS. Aeruginosa* (Gram-) | *C. Albicans* (Fungi) |
|---|---|---|---|---|---|
| Negative control (light-) | *100.0±11.7* | *100.0±5.3* | *100.0±3.7* | *100.0±8.7* | *100.0±37.3* |
| F-32L | *106.0±30.2* | *98.6±8.3* | *93.3±15.0* | *96.8±6.5* | *103.3±13.3* |
| **1**$^{0.1}$@F-32L | *92.5±9.9* | *94.4±4.1* | *97.3±11.5* | *97.5±7.5* | *96.5±25.9* |
| **1**$^{0.5}$@F-32L | *88.3±11.3* | *85.5±3.3* | *13.2±2.5* | *65.3±7.7* | *46.8±14.0* |
| **1**$^{1}$@F-32L | *43.5±12.3* | *32.6±5.4* | *8.0±1.0* | *9.2±1.4* | *11.1±3.4* |
| **1**$^{2}$@F-32L | *9.5±3.0* | *9.9±2.4* | *7.6±1.2* | *6.1±1.0* | *5.7±1.0* |
| **1**$^{5}$@F-32L | *11.1±3.9* | *9.1±1.2* | *7.6±1.0* | *6.0±0* | *5.4±0.7* |
| F-32L | *101.0±21.8* | *96.3±9.3* | *95.7±10.2* | *99.2±5* | *101±8.4* |
| **1**$^{0.1}$@F-32L$^{S}$ | *101.8±11.1* | *99.0±15.0* | *101.4±3.2* | *99.2±17.0* | *89.4±50.8* |
| **1**$^{0.5}$@F-32L$^{S}$ | *96.1±9.3* | *90.2±8.1* | *17.6±7.6* | *73.8±6.4* | *54.9±3.2* |
| **1**$^{1}$@F-32L$^{S}$ | *44.0±12.4* | *33.9±5.0* | *8.2±1.0* | *9.9±1.0* | *12.1±2.9* |
| **1**$^{2}$@F-32L$^{S}$ | *12.2±5.4* | *10.2±1.3* | *7.7±0.4* | *9.0±1.6* | *3.8±1.8* |
| **1**$^{5}$@F-32L$^{S}$ | *8.4±1.7* | *8.8±1.6* | *7.6±0.3* | *8.5±1.5* | *3.2±2.0* |

Blue – less than 25%, orange – 25-85%, white – more than 85% survived microorganisms.

## References

1. O. A. Efremova, Y. A. Vorotnikov, K. A. Brylev, N. A. Vorotnikova, I. N. Novozhilov, N. V. Kuratieva, M. V. Edeleva, D. M. Benoit, N. Kitamura, Y. V. Mironov, M. A. Shestopalov and A. J. Sutherland, Octahedral Molybdenum Cluster Complexes with Aromatic Sulfonate Ligands, *Dalton T*, 2016, **45**, 15427-15435. https://doi.org/10.1039/c6dt02863b