Supporting Information

for

Multimodal noncontact atomic force microscopy and Kelvin probe force microscopy investigations of organolead tribromide perovskite single crystals

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Additional experimental data

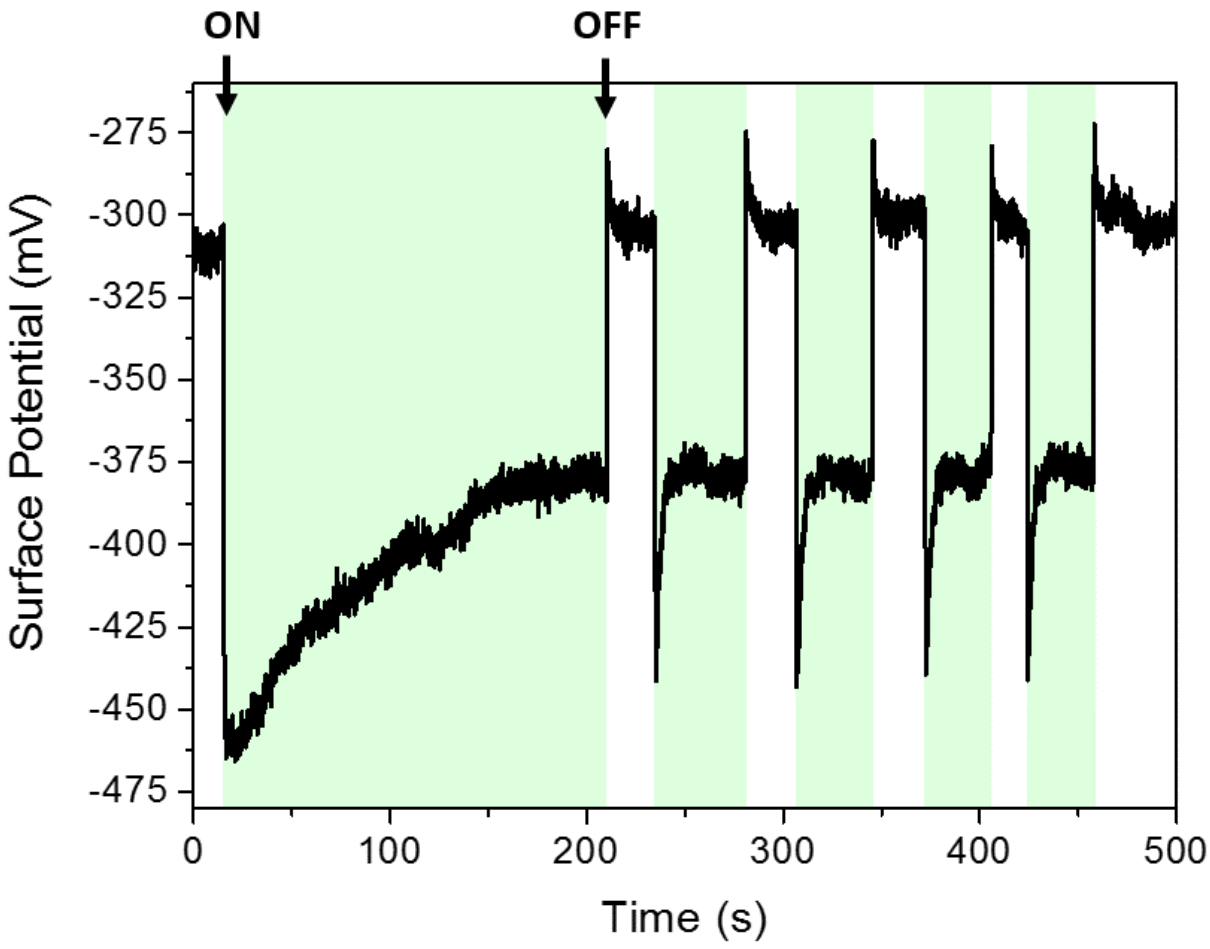

Figure S1: Plot of the KPFM surface potential as a function of time during five successive illumination sequences (λ = 515 nm, P_{opt} = 2.95 W/cm^2).

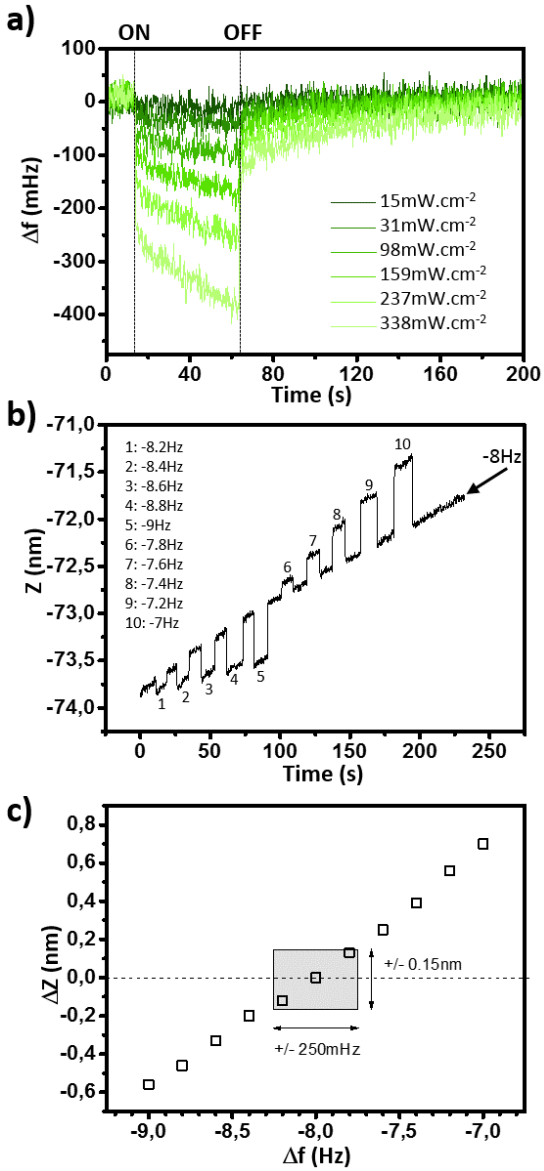

Figure S2: (a) Plots of the cantilever frequency shift as a function of time recorded during illumination sequences with increasing optical powers. The fast photo-response of the frequency shift is at maximum equal to 250 mHz.NB: these measurements have been performed with the tip kept at a fixed position 1μm away from the sample surface. **(b)** Tip height as a function of time. The frequency shift set-point (-8Hz for the line base) is changed while keeping the z-regulation active. **(c)** Relative height change as a function of the frequency shift setpoint deduced from the data presented in b). From these data, we estimate that a frequency detuning of 250 mHz shall induce a z-artefact of 0.15 nm.

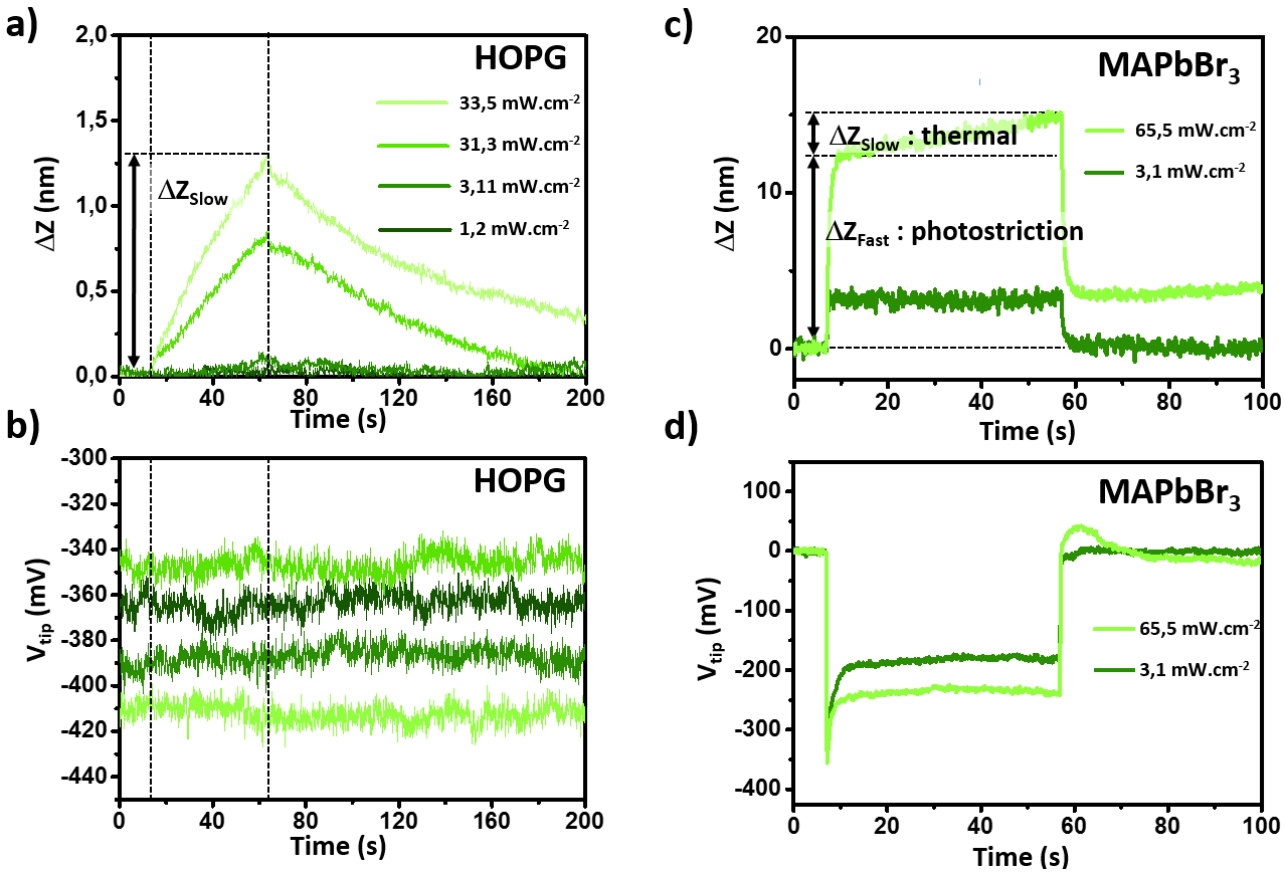

Figure S3: (a,b) Plots of the tip height change relative to its initial position (a) and of the KPFM surface potential (b) and as a function of time during illumination sequences (λ = 515 nm) performed with 4 different optical powers on an HOPG substrate. (c,d) Plots of the tip height change relative to its initial position (c) and of the KPFM surface potential (d) and as a function of time during illumination sequences (λ = 515 nm) performed with 2 different optical powers on the $MAPbBr_3$ single crystal. The curves of the surface potential have been normalized by shifting the y-values in such a way that the SP at t = 0 is equal to 0 mV.

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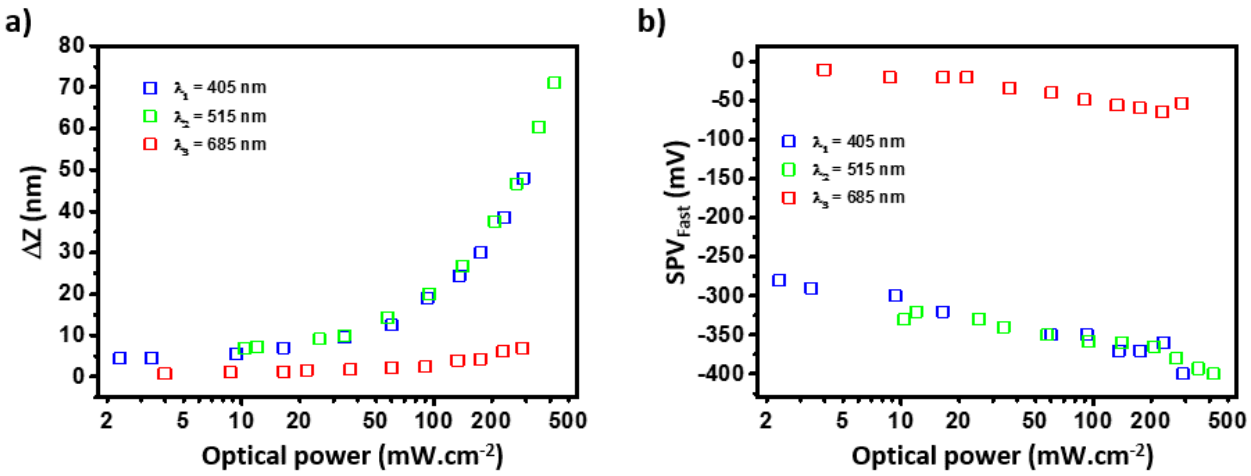

Figure S4: (a,b) Photostrictive signal (a) and fast component of the surface photovoltage (b) as a function of the optical power for three different wavelength.

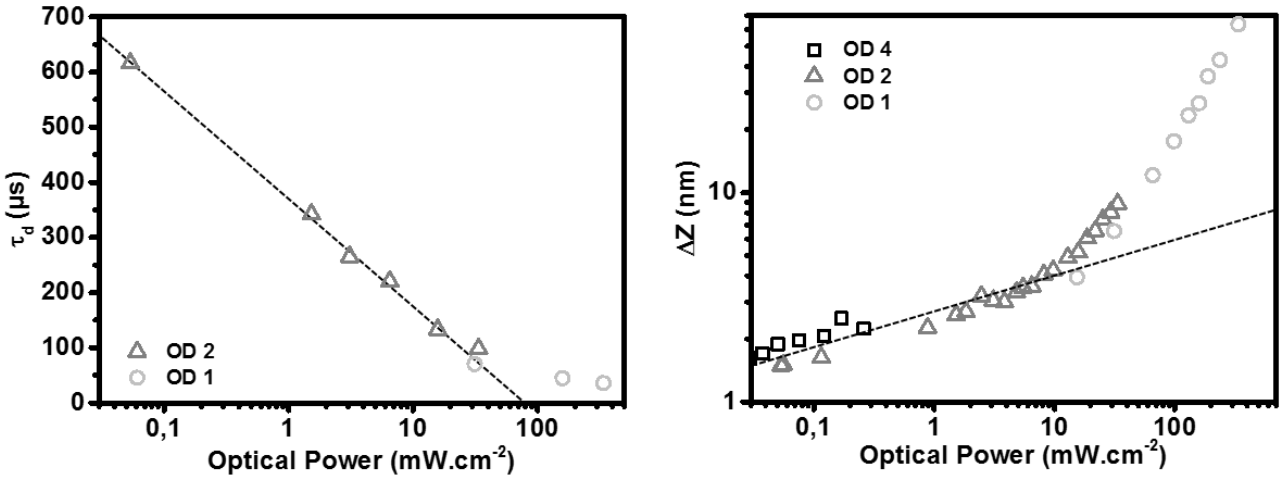

Figure S5: (a) SPV decay time constant measured by FMI-KPFM as a function of the optical power. (b) Photostrictive signal as a function of the optical power in log-log scale. λ = 515 nm. The dotted lines in a) and b) are only guidelines for the eye.