Supplementary information

Light and oxygen induce chain scission of conjugated polymers in solution

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1. Calculation of the integrated light power density (integrated over the MEH-PPV absorption band)

The spectrum of the halogen lamp irradiation was approximated by the blackbody radiation spectrum. Thus, the spectrum of the emission follows the Planck formula and depends on the temperature of the blackbody. Since we could not measure the temperature, we measured the light intensity within two different wavelength regions using band pass filters (456 ± 20 nm and 590 ± 20 nm) and reconstructed the blackbody curve by adjusting the temperature to match the experimental powers measured through the filters.

The reconstruction of the blackbody spectral shape was performed using the formula expressing the intensity of the radiation emitted by a blackbody as a function of wavelength:

$$Spectral\ Radiance = \frac{2hc^2}{\lambda^5}\frac{1}{e^{\frac{hc}{\lambda kT}}-1}\ [\mathrm{W\ m^{-3}}]$$

Where λ is the wavelength, h is the Planck constant, c is the speed of light, k is the Boltzmann constant and T is the temperature.

The integrated power which the sample was exposed to was calculated by integration of the reconstructed spectrum over the absorption range of the polymer (400-550 nm). By dividing this power by the area of the power meter sensor we obtained power density. When integrating the region of the filter on the reconstructed spectrum we could find back the experimental value with an error inferior to 10%.

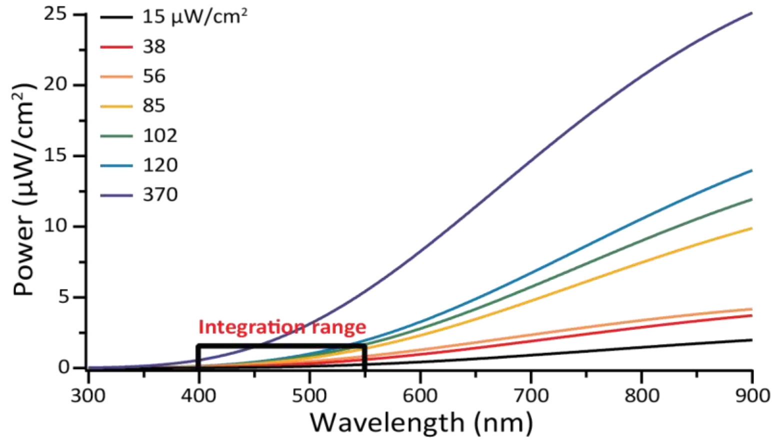

Figure S1: (a) Blackbody curves used for the power calculation.

To compare the power used in our experiments with the typical illumination in different work environments, we also integrated the power modulated by the photopic function, which allowed us to calculate the power in lumen/m^2. The photopic function represents the eye sensitivity and is used to define the power needed to obtain a candela at other wavelengths than the reference (555 nm).

Table S1. Correspondence between the light power density measured through the band-pass filter (*Pband*) and the light power density integrated of the MEH-PPV absorption spectrum. For comparison, typical light illumination in various work environments have been included in the table.

Power density used in our experiments *Pband* (µW/cm²)	Integrated power density (µW/cm²)	Power (lumen/m²)	Comparison with various work environments
2.4	15	54	Working areas with few or no visual tasks
6.4	38	133	
9.9	56	190	
13.7	85	300	Classrooms, Easy office work
16.5	102	366	
19.3	120	428	Normal office work, Library
67.2	370	1250	Normal drawing work, Fine mechanics workshop

2. Experimental setup

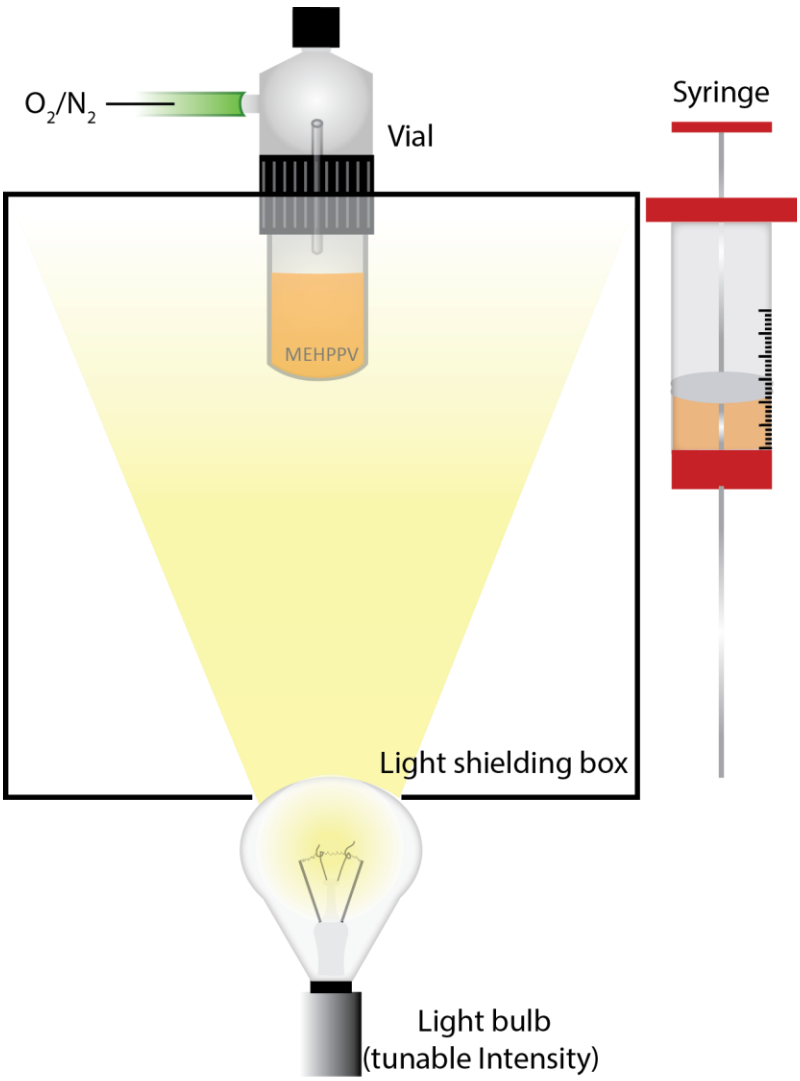

Figure S2. Experimental setup. The specially designed vial allowed us to have a constant flow of gas while the sample was exposed to light. It also enabled us to extract the solution with minimal risk of interaction between the internal and external atmosphere. The vial consisst of an upper and a lower chamber connected by a thin stainless steel capillary.

3. Volume – Mw Calibration curve.

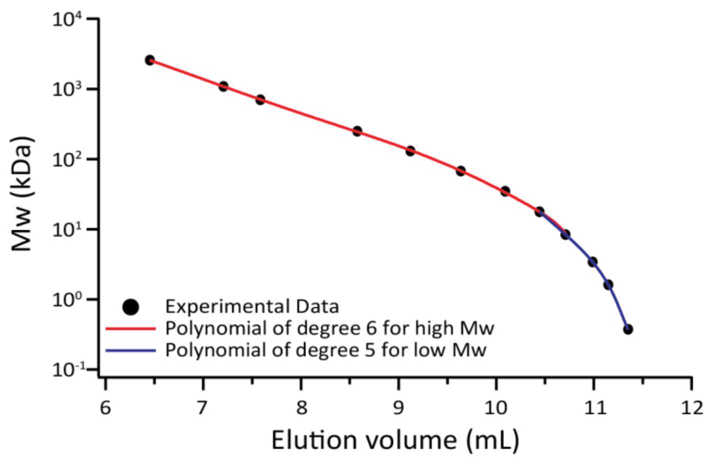

Figure S3. Calibration curve of the column-solvent combination used for Polystyrene standards. Two different polynomial fit had to be used to be able to fully described the column behavior. It can be seen that the accuracy of the separation decrease for low molecular weight as a small change in time leads to a tremendous change in Mw.

4. GPC elution profiles in dark and exposed to room light.

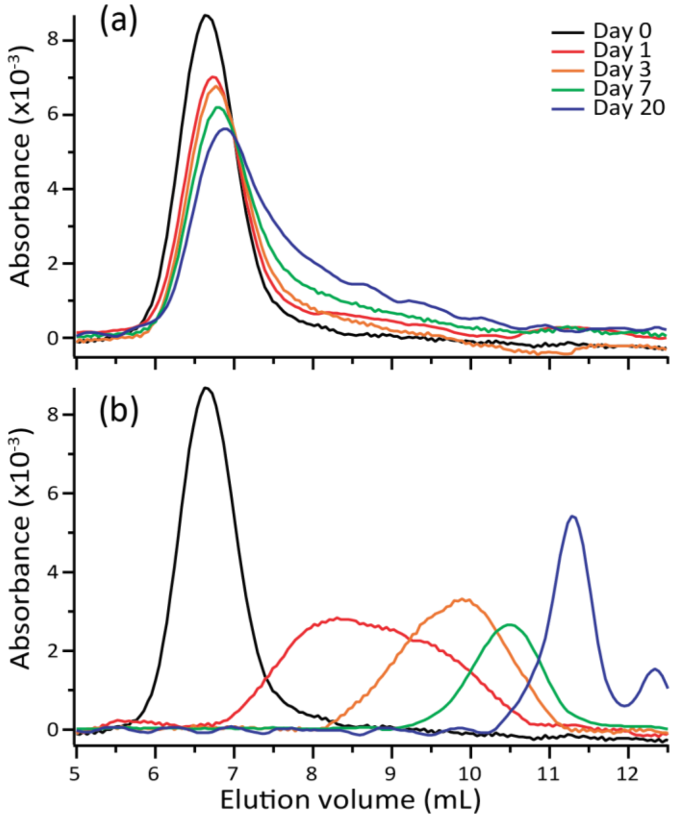

Figure S4. Elution profile of MEH-PPV stored in the dark (a) and exposed to room light (b).

5. Reciprocal Mw vs time for different oxygen environment

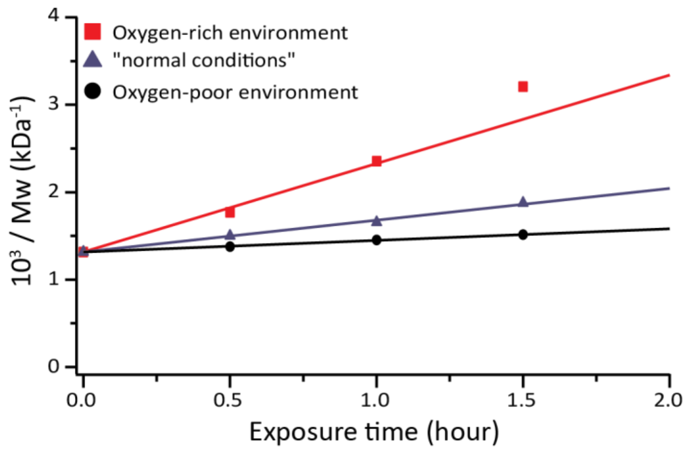

Figure S5. Reciprocal Mw as a function of time for different oxygen environment. A linear relation is observed but, similarly as for the power dependence, a deviation is seen at high degradation. Once again, this is due to the extent of the degradation being too large to consider PDI to be constant.