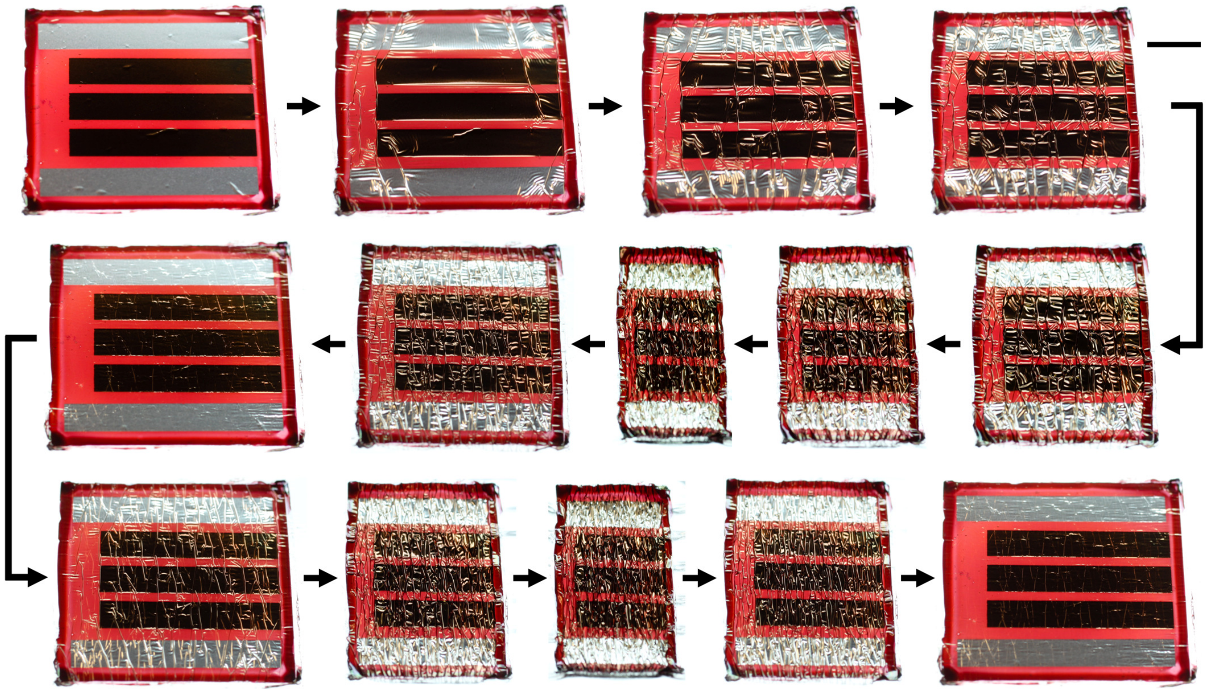
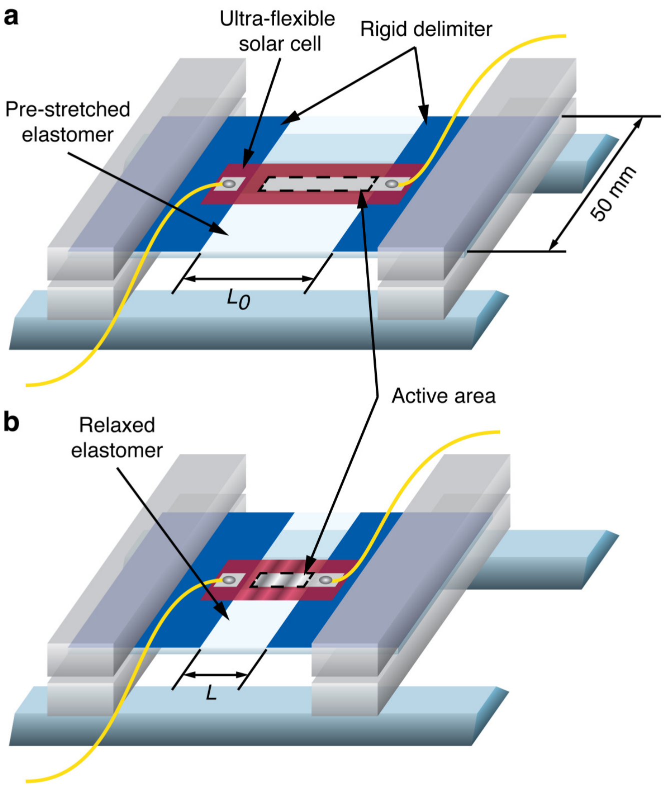
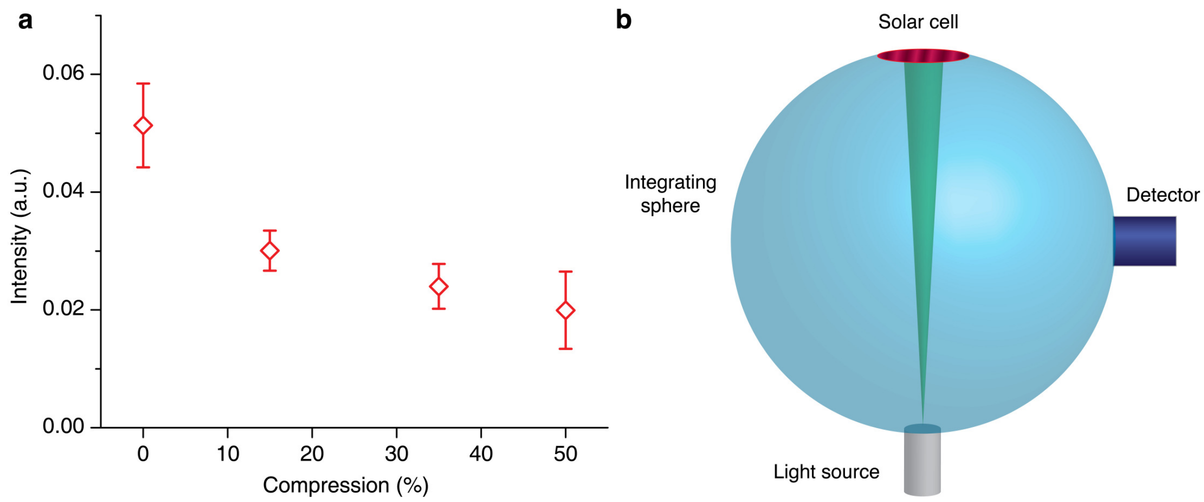


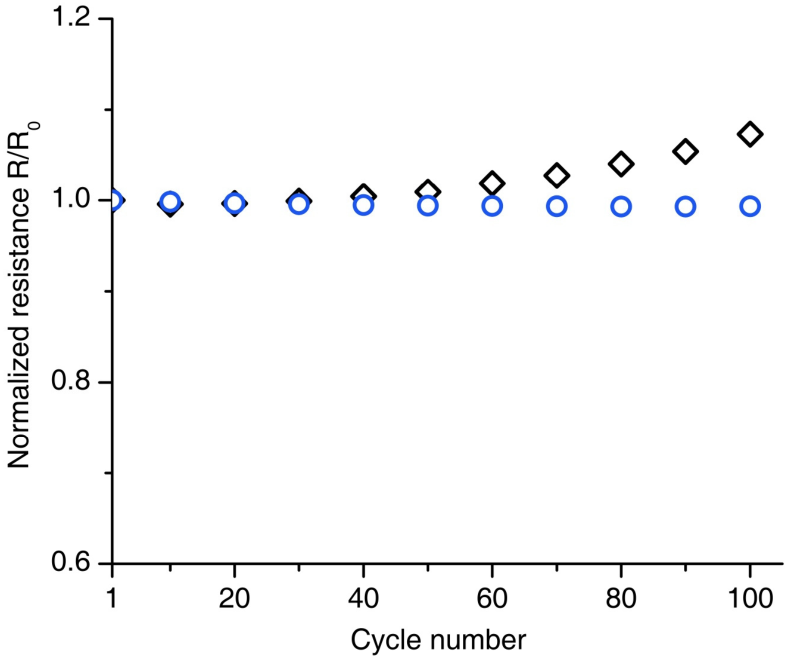
Supplementary Figure S1 | Cyclic compression and re-stretching of an ultrathin organic solar cell. A photographical sequence of stepwise compression and re-stretching of our ultrathin organic solar cells, illustrating the extreme mechanical resilience of the fabricated devices. The flexible device adheres very well to the pre-stretched acrylic glue VHB 4905. A gradual release of the prestrain results in the formation of fine, out-of plane wrinkles, that take up most of the mechanical strain. This concept allows the solar cell to be reversibly compressed to less than 70% of its original size, whilst remaining fully functional. Scale bar 4 mm (top right).



Supplementary Figure S2 | Schematic of the compression/stretching test apparatus. This schematic shows the basic idea and important pieces of the compression/stretching apparatus, but is not drawn to-scale. (**a**) The compression zone between the rigid delimiters (dark blue) is 1 cm long in the fully extended state (L_0). (**b**) Upon compression, the delimiters are brought closer together where the new distance (L) is used to determine the compression and tensile strain.



Supplementary Figure S3 | Relative total reflectance. (**a**) Relative total reflectance of an ultra-flexible solar cell both for a planar (0% compression) cell as in various stages of compression (15%, 35% and 50%). It is evident that less light is reflected in the various stages of compression. The error bars represent 8 averaged measurements to account for positional variations. (**b**) A shematic illustrating how an integrating sphere is used to measure the relative total reflectance. Samples are illuminated by a 532nm wavelength laser, and the relative intensity of the reflected light is measured by a Tristan light spectrometer.



Supplementary Figure S4 | Relative resistance upon cyclic compression and stretching. The normalized resistance of a Ag (black diamonds), and a PEDOT:PSS (Clevios PH 1000) (blue circles) film on 1.4 μm PET substrate is shown as a function of the number of cycles to 50% compression. The size and shape of the conductive film was designed to be approximately the same for both, and both are roughly equivalent to a device electrode used in the solar cells. It is evident that the metal layer resistance increases by roughly 8% after 100 cycles. The resistance of the PEDOT:PSS layer shows very little (<1%) deviation over 100 cycles. A more complete analysis of these results is in progress.

Film thickness	1.4 μm
RMS Surface Roughness	26 nm
Maximum Roughness Height	700 nm
Shrinkage (150°C 30min)	2.1%
Dielectric Constant	3.25
Dielectric Strenght	200 V/μm

Suplementary Table S1 | Physical properties of Mylar® 1.4 CW02. Data taken from Dupont Teijin Films product information sheet