Photoresponse of off-stoichiometry *thiol-ene-epoxy* ($OSTE^+$) Polymer

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Contact angle measurement:

The thickness of this thin film was found 32.6 µm for the off- stoichiometry of 60% thiol and 40% allyl+epoxy. The contact angle of the monomer mixed liquid sample was found 93° as illustrated in Fig. S1.

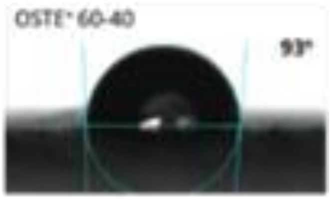

Fig. S1. Measured hydrophobicity of prepared monomer stock solution.

Optoelectrical property:

The I-V under illumination from a broadband light source of a xenon lamp was measured using a UV-Visible optical fiber connected to the probe stage as shown in Fig. S2(a). The custom-designed I-V probe station was illuminated with the Xenon lamp to study the light illuminating device current characteristic. The xenon lamp intensity profile is measured in a photo-spectrometer and presented in Fig. S2(b) within the range of 200 nm to 450 nm wavelength.

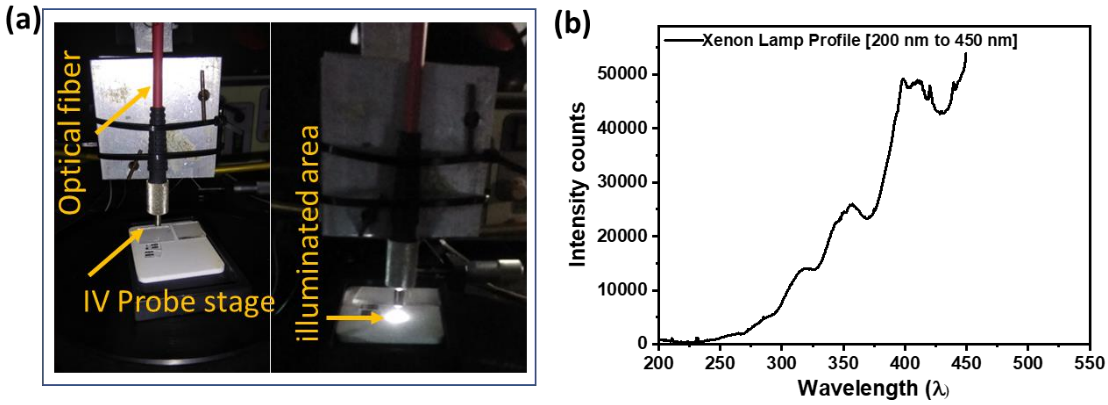

Fig. S2. (a) I-V probe illuminated by optical fiber connected with a Xenon lamp, (b) wavelength vs intensity profile of the xenon lamp [presented between 200 nm to 450 nm wavelength]

First. the electric field-assisted device current stability (time vs current) without any light illumination was studied. As observed in Fig. S3, the dark current stabilized around 60 to 70 seconds at +3V DC bias voltage. Any responsive behaviour was studied after stabilizing the dark current.

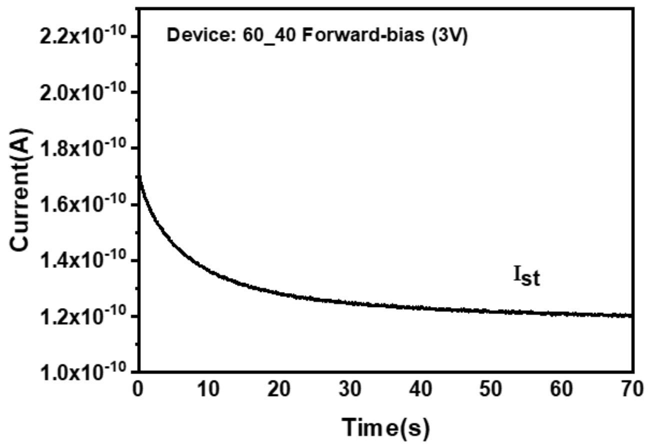

Fig. S3. The electric field-assisted current at +3V voltage was applied across the electrodes and waited around t_0=60 to 70 seconds to stabilize the current.

The transient I-V was measured to understand the photo-responsive behaviour of this polymer device. For the transient characteristic, a microcontroller programmed mechanical chopper was used to create 20-second on-off states of laser light beam. The photoinduced current was measured at different laser power incidents on the device after 70 seconds of illumination.

Time constant calculation:

The rise time constant (τ_r) was calculated from the exponential fitting of the rising edge data (interval of response to the rise of current from 10 to 90% of steady value) of the photo-current response as shown in Fig. S4 (on-state) due to different laser power irradiated on the device. The rise time was found to be τ_r = 0.52±0.06 seconds at 18.49 µW power. Similarly, the decay time (interval of response to decay from 90 to 10% from its saturated current value) shows bi-exponential behavior with two different time constants τ_{d1} and τ_{d2} that were calculated from the fitting parameters (Fig. S4, off-state). The fast decay time was found τ_{d1}=0.70±0.03 seconds due to direct recombination of the photo-generated charge carriers. The longer time for the recombination was found from the slow decay time τ_{d2} =6.6 ±0.13 seconds. These decay times were found faster at higher laser power irradiated.

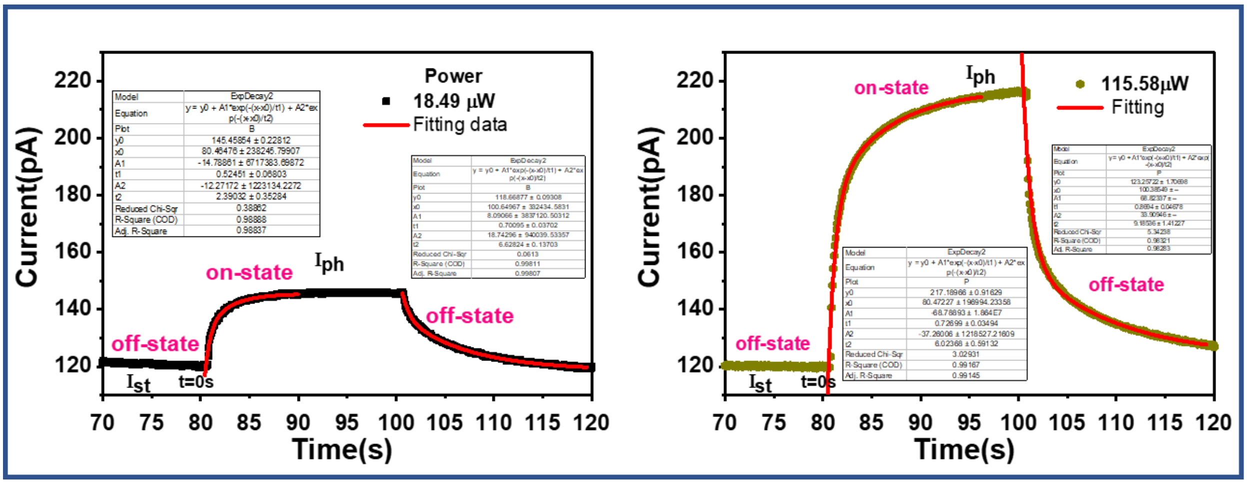

Fig. S4. Fitting of photoinduced current dynamics at various light intensity, rising time and decay time calculation.