Supplementary Materials

Photo-responsivity Improvement of Photo-Mobile Polymers Actuators Based on a Novel LCs/Azobenzene Copolymer and ZnO Nanoparticles Network

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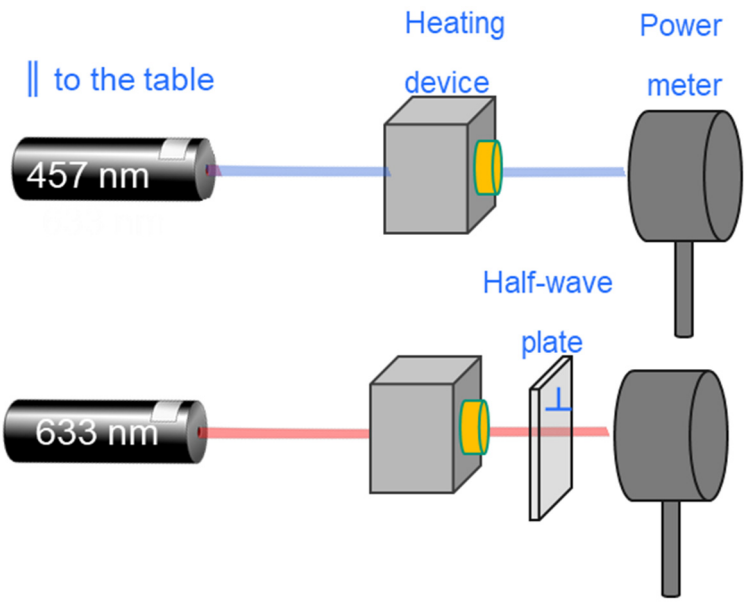


Figure S1. Setup for the measurement of transmitted light and birefringence.

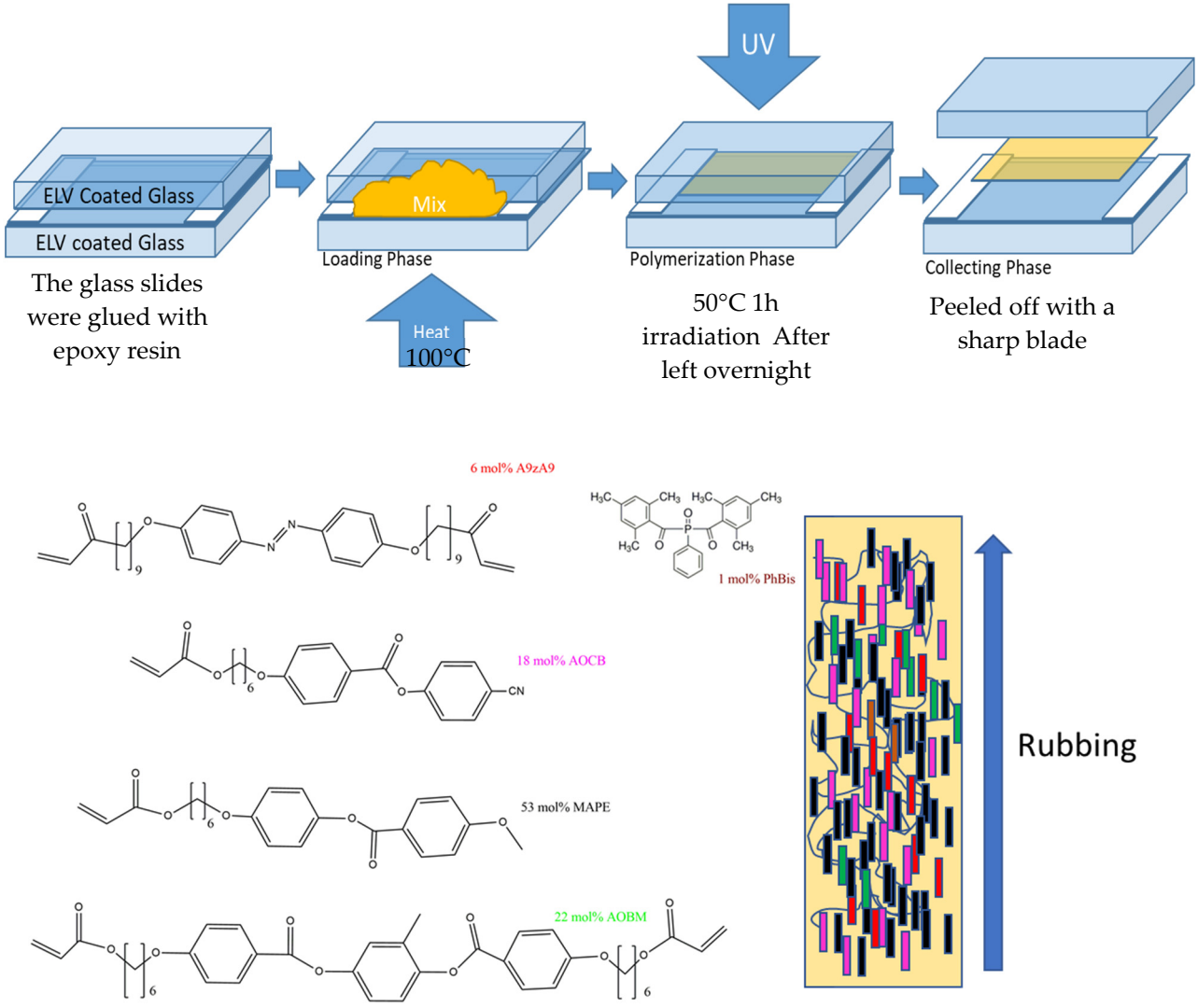


Figure S2. (**Up**) Preparation of glass reactor cells and polymerization. (**down**) Monomer and Polymer structure.

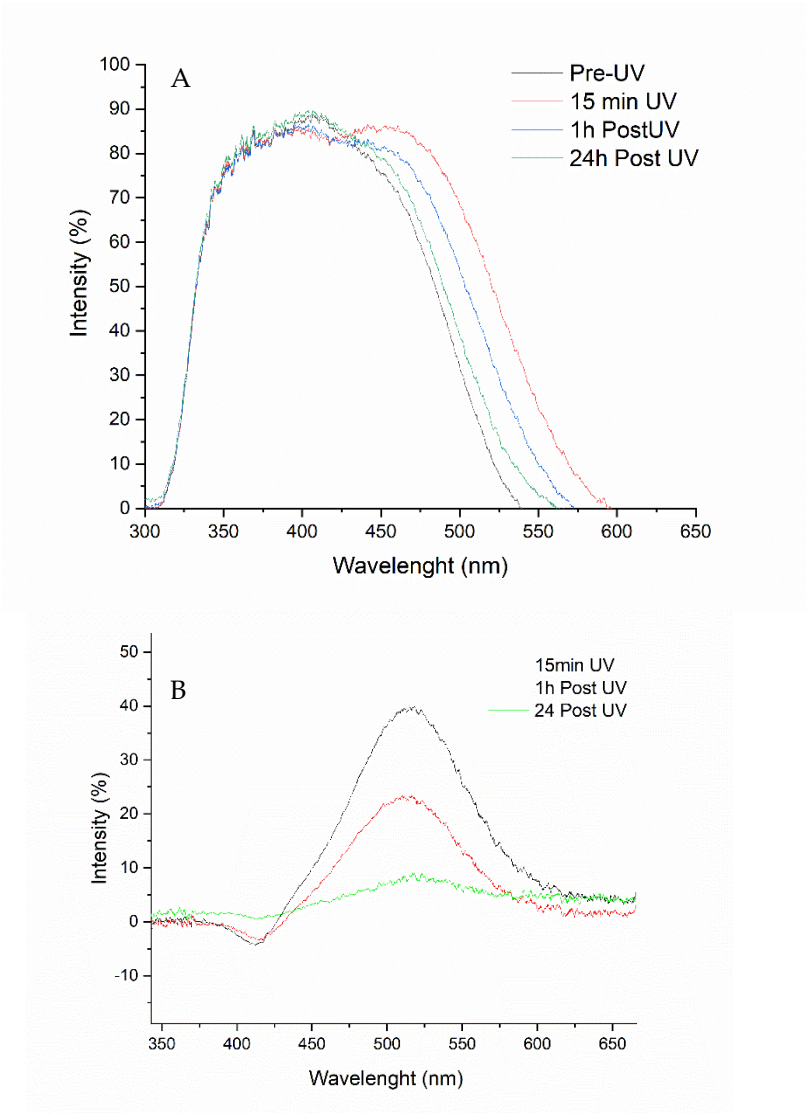


Figure S3. (**A**) Absorbance of the azobenzene moieties embedded in the PMP, obtained by subtracting the contribution of the other elements in the PMP (**B**) Absorbance of azobenzene moieties in *trans* post irradiation, obtained subtracting the absorbance of the PMP pre-UV.

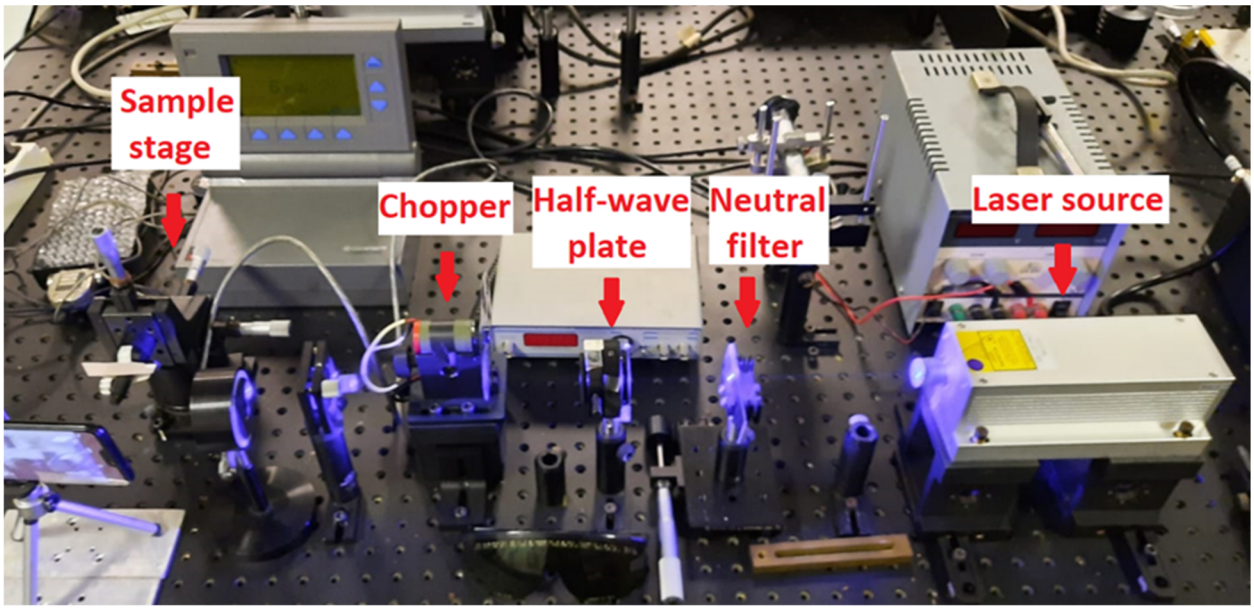


Figure S4. Setup for characterization of PMPs light response.

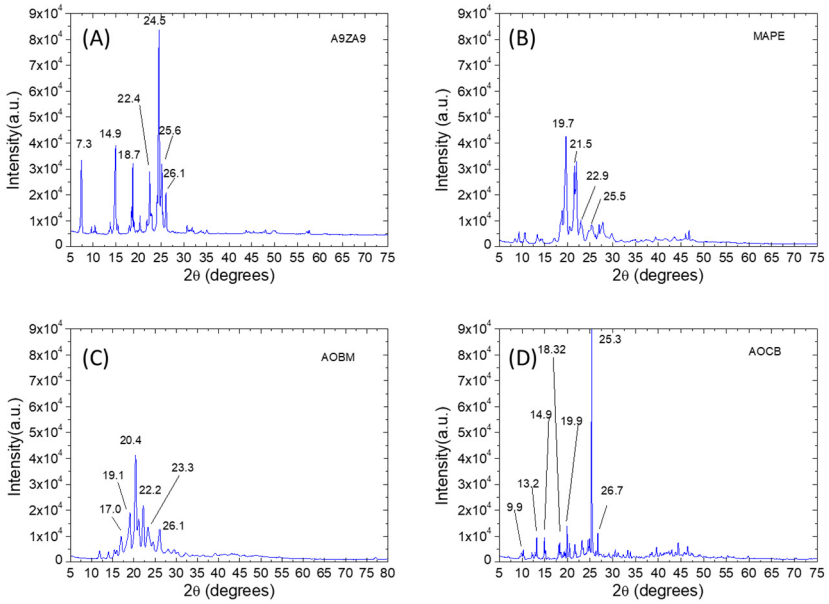


Figure S5. X-ray diffraction patterns (Cu Kα) of the starting monomer powders. (**A**) A9ZA9, (**B**) MAPE, (**C**) AOBM, (**D**) AOCB.

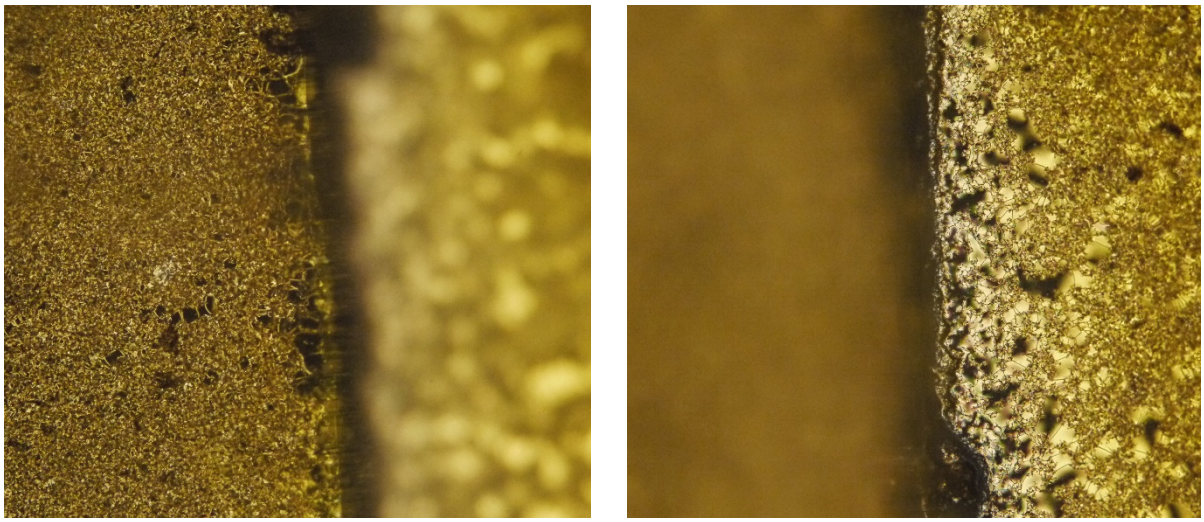


Figure S6. Picture of melted monomer penetrated in the cell (**left**) and outside the cell (**right**). In both the pictures it is possible to see trails formed by the interaction of nanoparticles and LCs. Objective 10x.

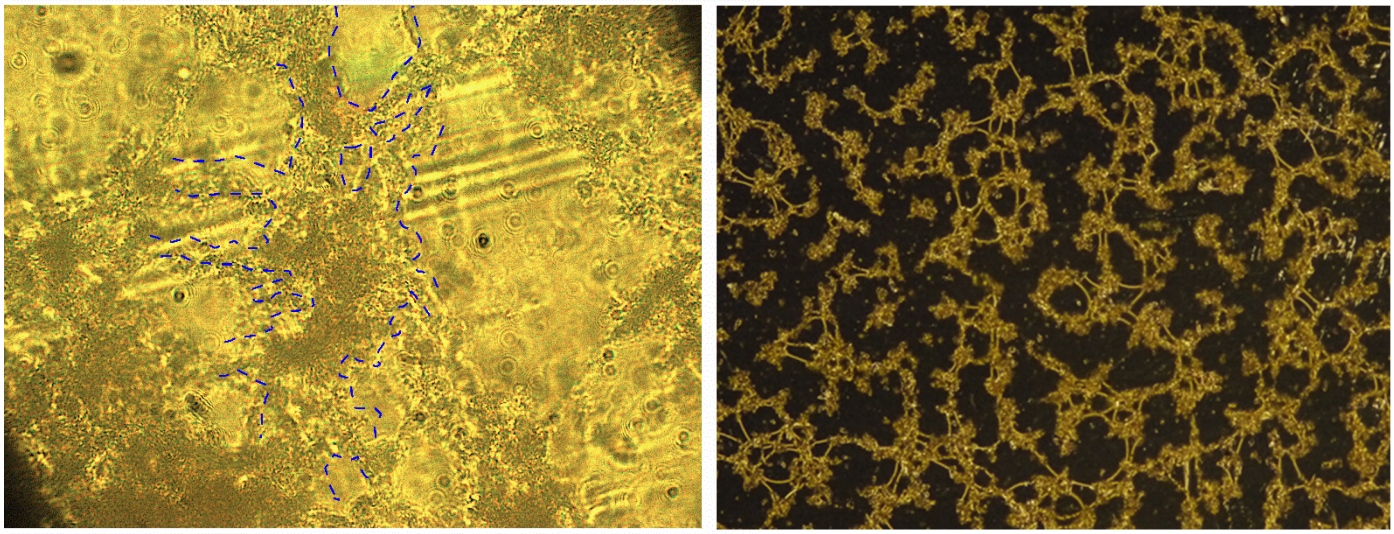


Figure S7. Aggregates and trails formed by nanoparticles. On the **left** a closeup picture (100x) of a cell-like structure in a Azo-LC-PMP(6%-Z) and on the **right** a Azo-LC-PMP (1%-ZnO) mixture showing the aggregates and trails (10x).

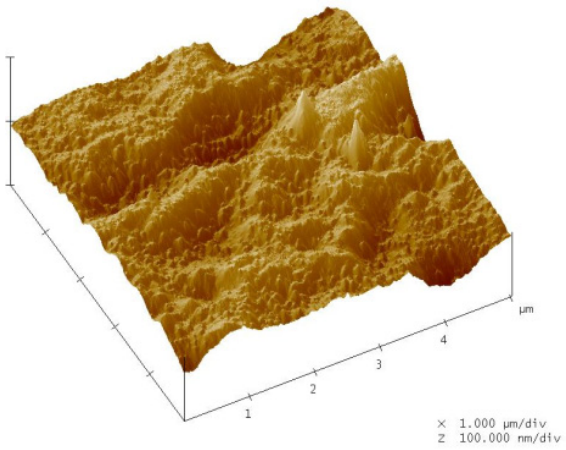
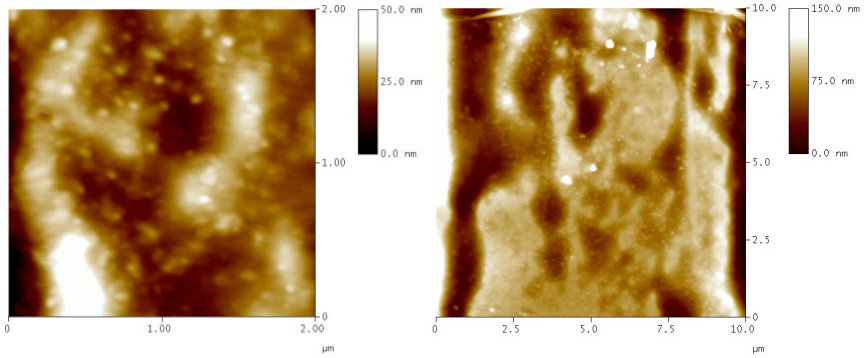


Figure S8. 3D-topography AFM image of ZnO-doped PMP film detected by scanning 5 × 5 µm²-sized area.



(**A**) (**B**)

Figure S9. Topography AFM images of ZnO-doped PMP film detected by scanning 2 × 2 µm² (**A**) and 10 x 10 m² (**B**) -sized areas.

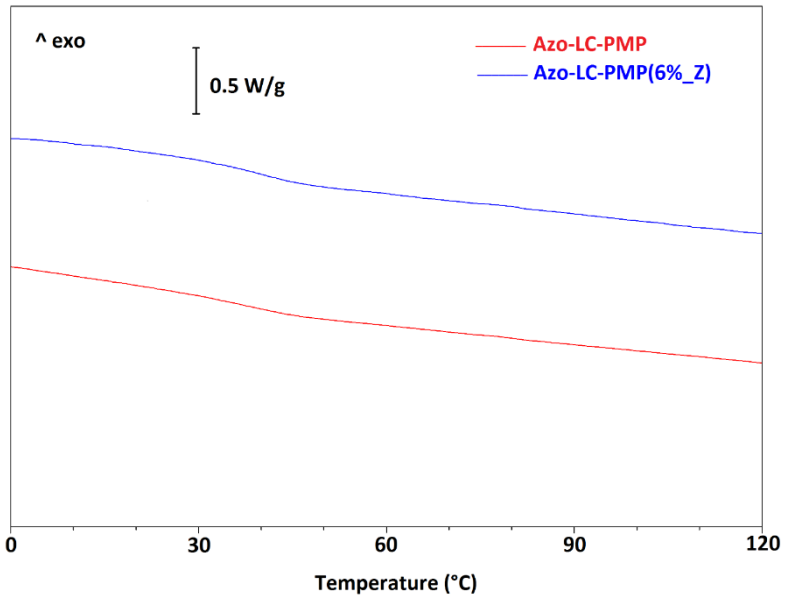


Figure S10. DSC Thermograms of Azo-LC-PMP and ZnO composite scans.

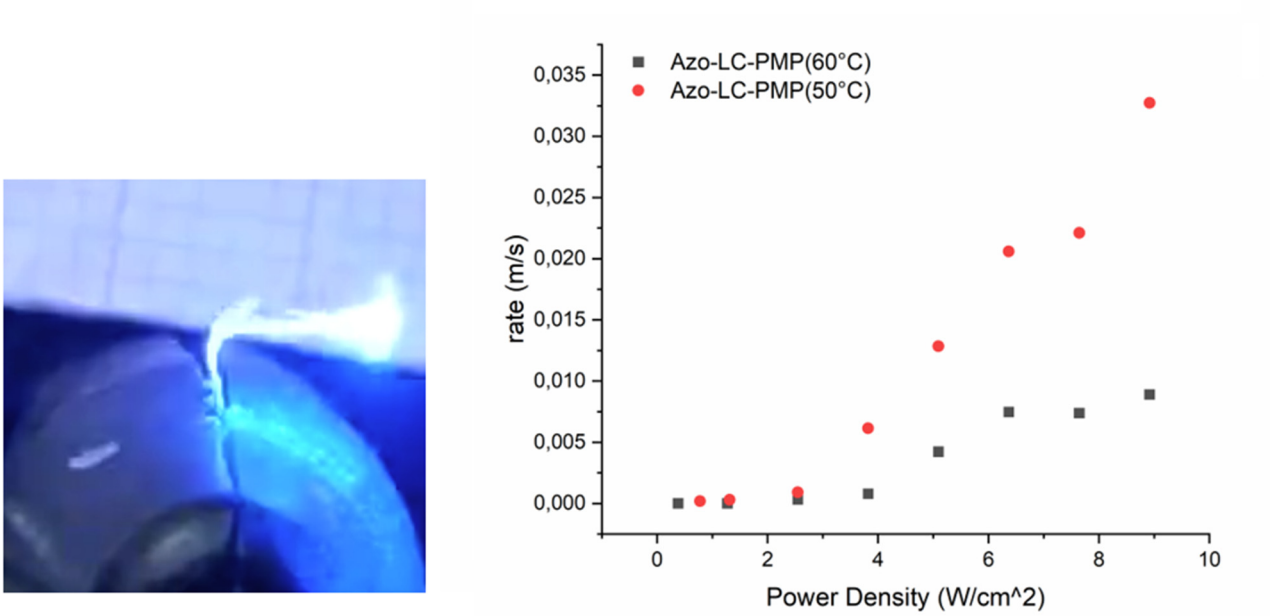


Figure S11. (**left**) Self-Oscillating Azo-LC-PMP without ZnO nanoparticles (**right**) Bending speed (m/s) of Azo-LC- PMP Z polymerized at 50 °C and 60 °C. Showing the improved performance of the film when polymerized at the nematic temperature.