Photoconductive nonpolar liquids based on azobenzene

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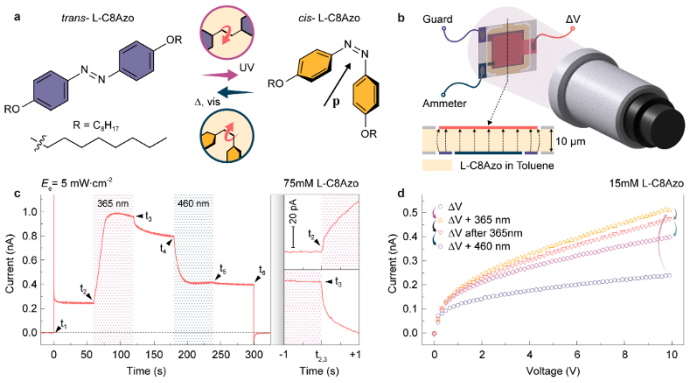
The weakly conductive properties of mixtures of organic surfactants in nonpolar liquids are fundamental in many electrohydrodynamic phenomena and central for several cutting-edge applications, in particular in the field of the nowadays ubiquitous electrophoretic displays. As of now, the way to tune the electrical properties of these systems is to regulate their composition: surfactant concentration, water content, and the choice of carrier liquid set the properties from the outset. Here, we use of photoresponsive molecules to tune electric phenomena in nonpolar liquids externally by light irradiation, thereby making them photoconductive. In particular, we focus on the properties of dispersions of azobenzenes in toluene as their conductivity can be regulated using two different wavelengths with opposing effects: shining UV light induces *trans→cis* isomerization leading to an increase in conductivity while irradiating with blue light stimulates the back-isomerization, causing a decrease in conductivity. The findings of this research offer a path to expand the applications of weakly conductive organic fluids, for example, towards self-regulating devices exposed to sunlight or externally programmable displays.



a. Scheme of the transition between trans and cis L-C8Azo. b. Schematic of the experimental set-up. c. Example of current measurement performed to evaluate the photoresponsivity of the mixture. d. Current-voltage profiles of the dispersion under different irradiation states.