Electronic Supplementary Material (ESI) for Physical Chemistry Chemical Physics.

Remarkable enhancement of the photoreactivity of polyfluoroalkyl azobenzene derivative in organic/inorganic nano-layered microenvironment

Vivek Ramakrishnan,[a] Daisuke Yamamoto,[a,b] Shin Sasamoto,[a] Tetsuya Shimada,[a,b] Yu Nabetani,[a,b] Hiroshi Tachibana,[a,b] and Haruo Inoue[a,b*]

[a] Department of Applied Chemistry, Tokyo Metropolitan University, 1-1 Minami-osawa, Hachioji, 192-0397, Japan.
E-mail: *inoue-haruo@tmu.ac.jp
[b] Center for artificial photosynthesis, Tokyo Metropolitan University, 1-1 Minami-osawa, Hachioji, 192-0397, Japan.

Electronic Supplementary Information

Figure S1

Figure S2a-g

Figure S3a-q

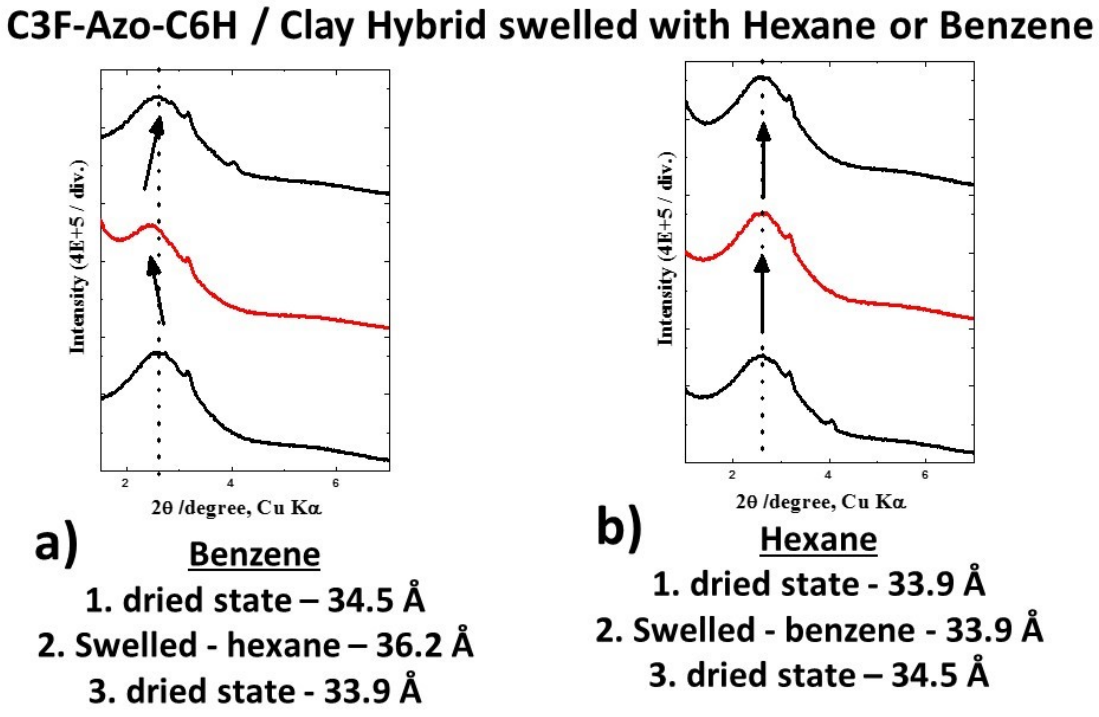


Figure S1. XRD Analysis of swelling of solvent
C3F-Azo-C&H/Clay (adsorbed amount of C3F-Azo-C6H is 4.2 eq. vs CEC)

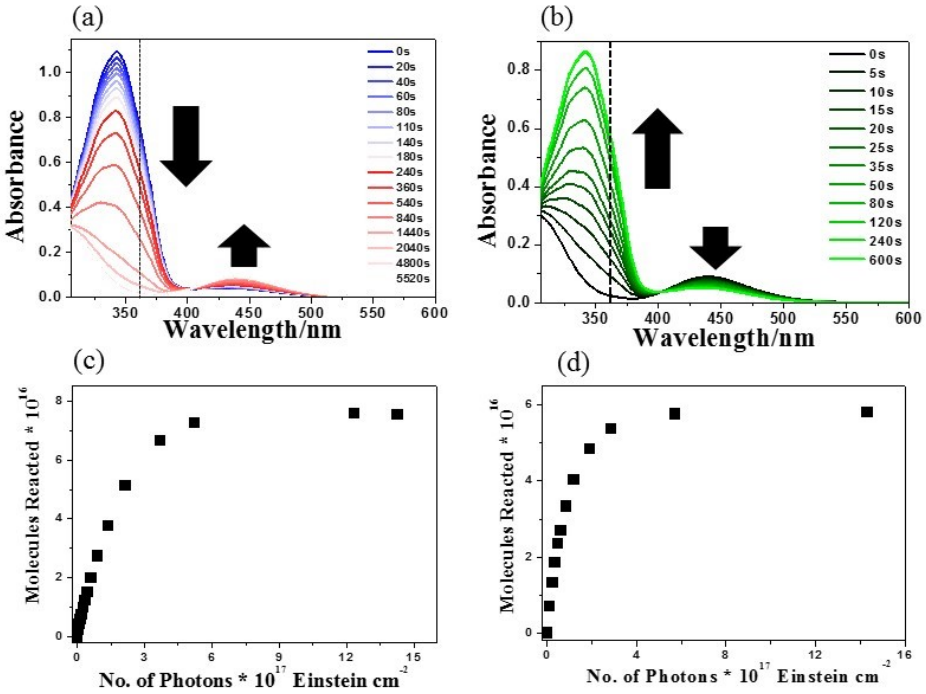


Figure S2a. Absorption spectrum changes of C3F-azo-C6H in ethanol (a) from all *trans* to *cis* rich state (b) *cis* rich state to *trans* rich state. Quantum efficiency calculations in ethanol (c) from all *trans* to *cis* rich state (d) *cis* rich state to *trans* rich state.

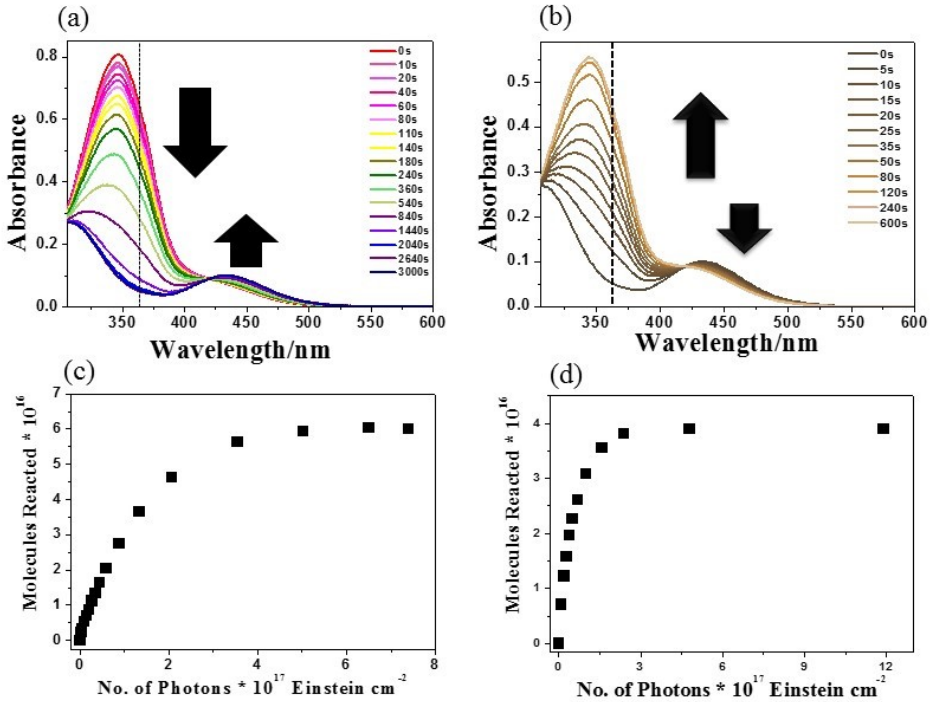


Figure S2b. Absorption spectrum changes of C3F-azo-C6H in micelle (a) from all *trans* to *cis* rich state (b) *cis* rich state to *trans* rich state. Quantum efficiency calculations in micelle (c) from all *trans* to *cis* rich state (d) *cis* rich state to *trans* rich state.

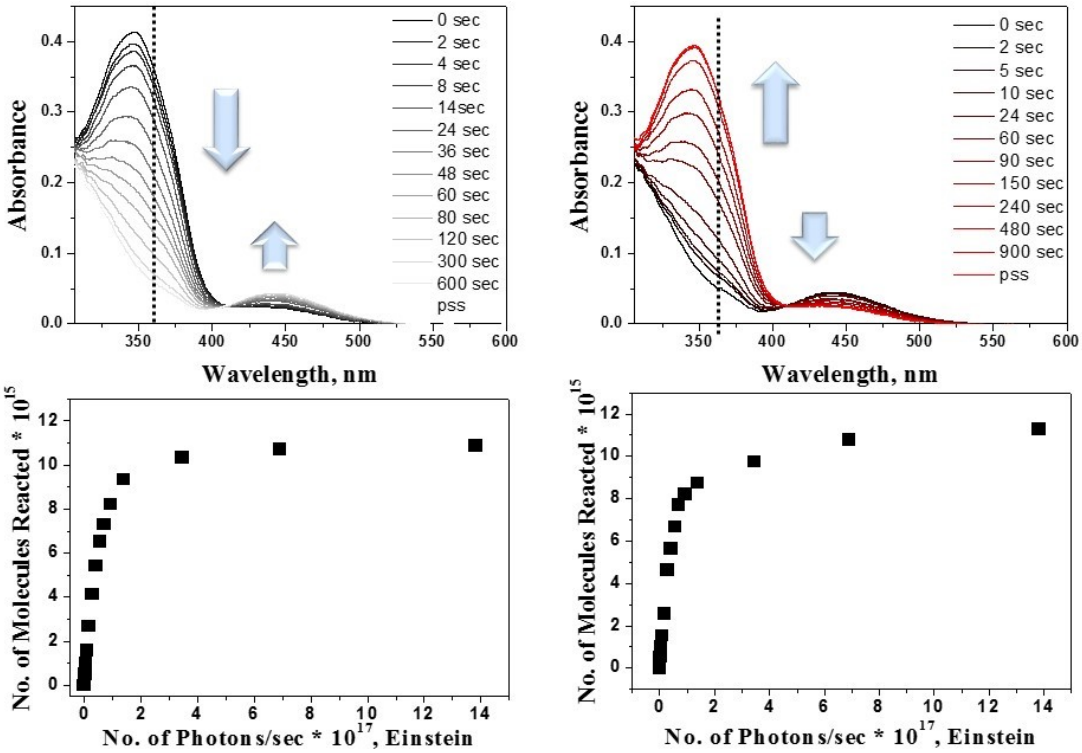


Figure S2c. Calculation of quantum efficiencies of C3F-azo-C6H/SSA hybrid in film state/swelled with benzene (a) from all *trans* to *cis* rich state (b) *cis* rich state to *trans* rich state. Calculation of quantum efficiencies (c) from all *trans* to *cis* rich state (d) *cis* rich state to *trans* rich state.

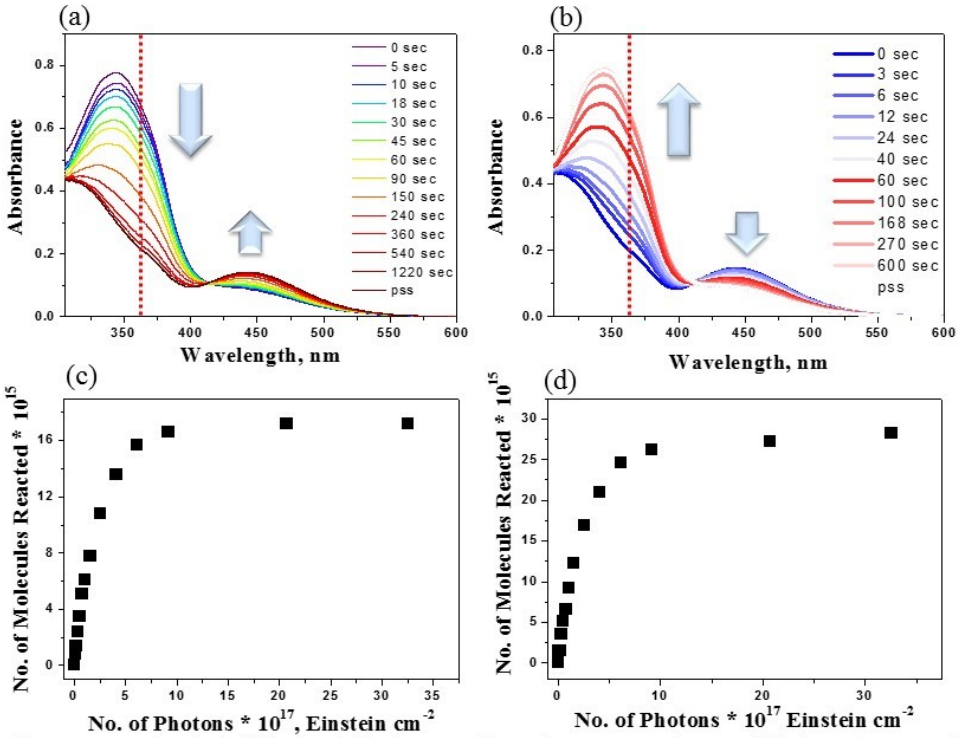


Figure S2d. C3F-azo-C6H/SSA hybrid film swelled in hexane - absorption spectrum changes of (a) from all *trans* to *cis* rich state (b) *cis* rich state to *trans* rich state. Quantum efficiency calculation (c) from all *trans* to *cis* rich state (d) *cis* rich state to *trans* rich state.

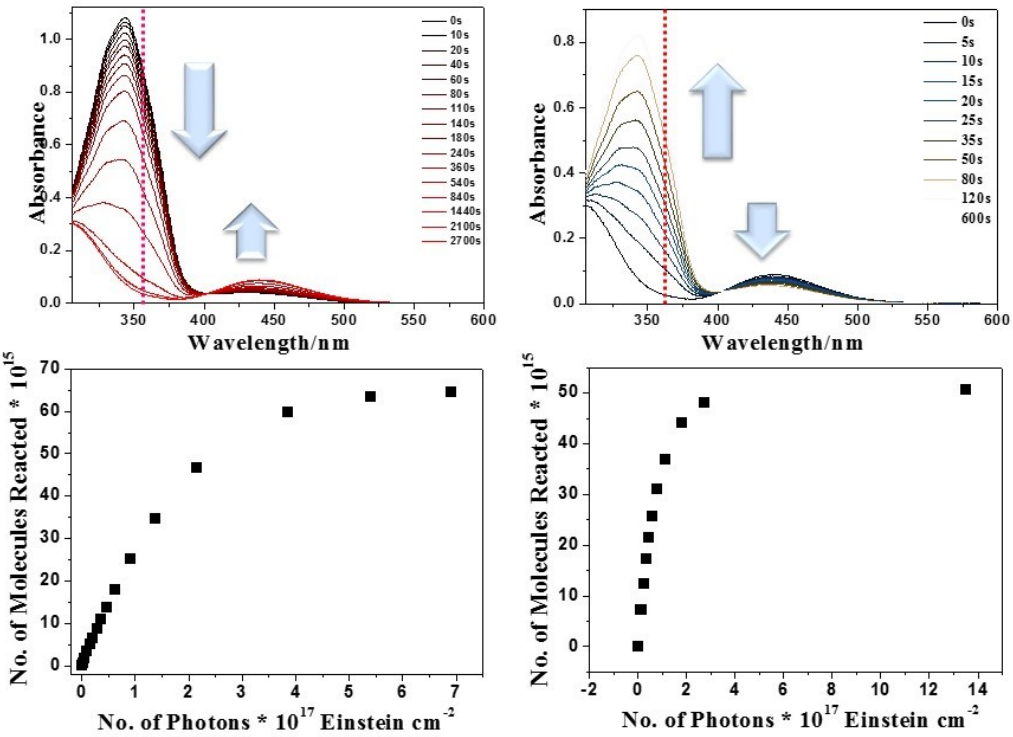


Figure S2e. Calculation of quantum efficiencies of C3H-azo-C6H in ethanol (a) from all *trans* to *cis* rich state (b) *cis* rich state to *trans* rich state. Calculation of quantum efficiencies (c) from all *trans* to *cis* rich state (d) *cis* rich state to *trans* rich state.

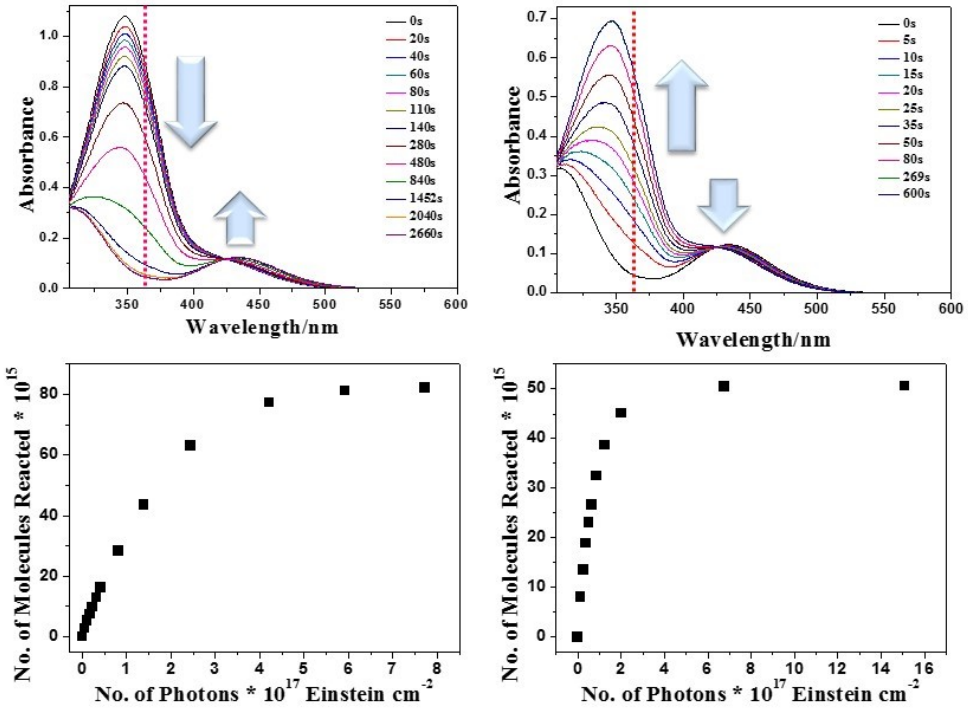


Figure S2f. Calculation of quantum efficiencies of C3H-azo-C6H micelle in water (a) from all *trans* to *cis* rich state (b) *cis* rich state to *trans* rich state. Calculation of quantum efficiencies (c) from all *trans* to *cis* rich state (d) *cis* rich state to *trans* rich state.

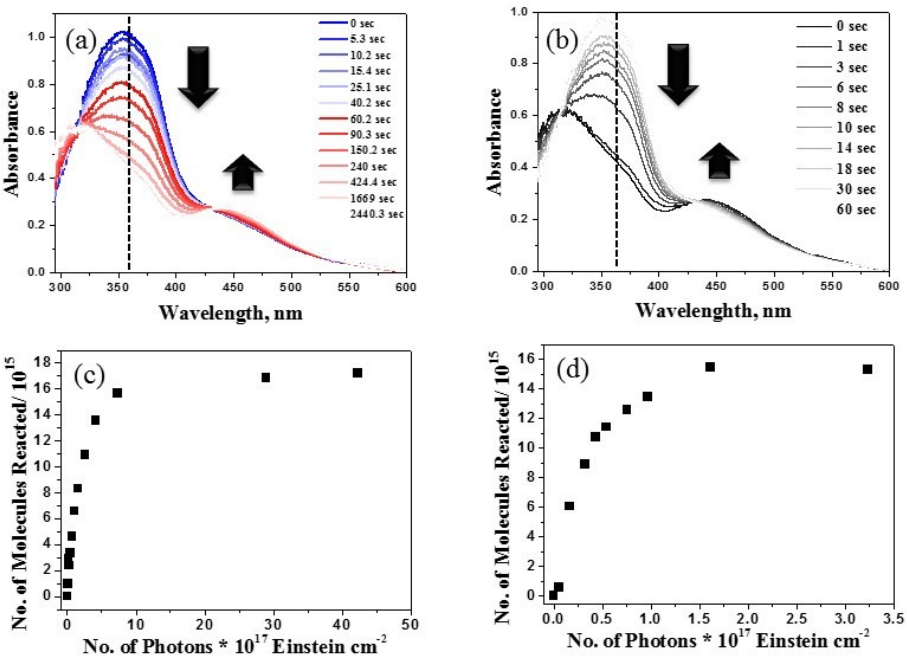


Figure S2g. Absorption spectrum changes of C3H-azo-C6H/SSA hybrid in film state/air (a) from all *trans* to *cis* rich state (b) *cis* rich state to *trans* rich state. Calculation of quantum efficiencies (c) from all *trans* to *cis* rich state (d) *cis* rich state to *trans* rich state.

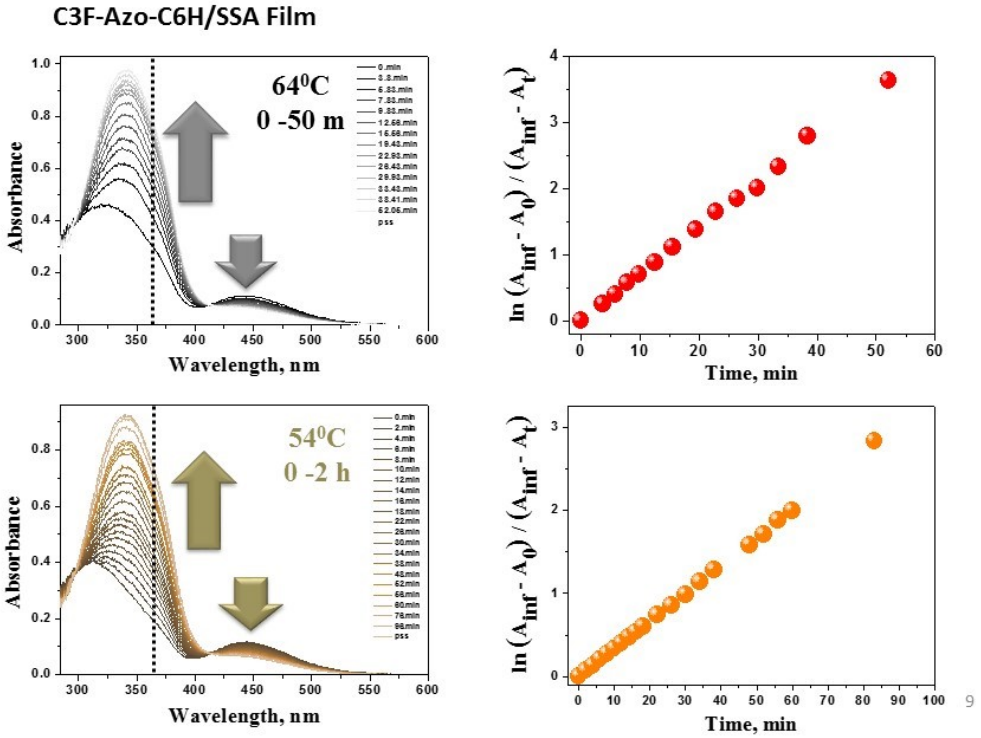


Figure S3a. Estimation of activation energy for the conversion of cis- into trans-form in the dark at various temperature (1) : C3F-Azo-C6H/SSA Film, adsorbed amount of C3F-Azo-C6H is 4.2 eq. vs CEC.

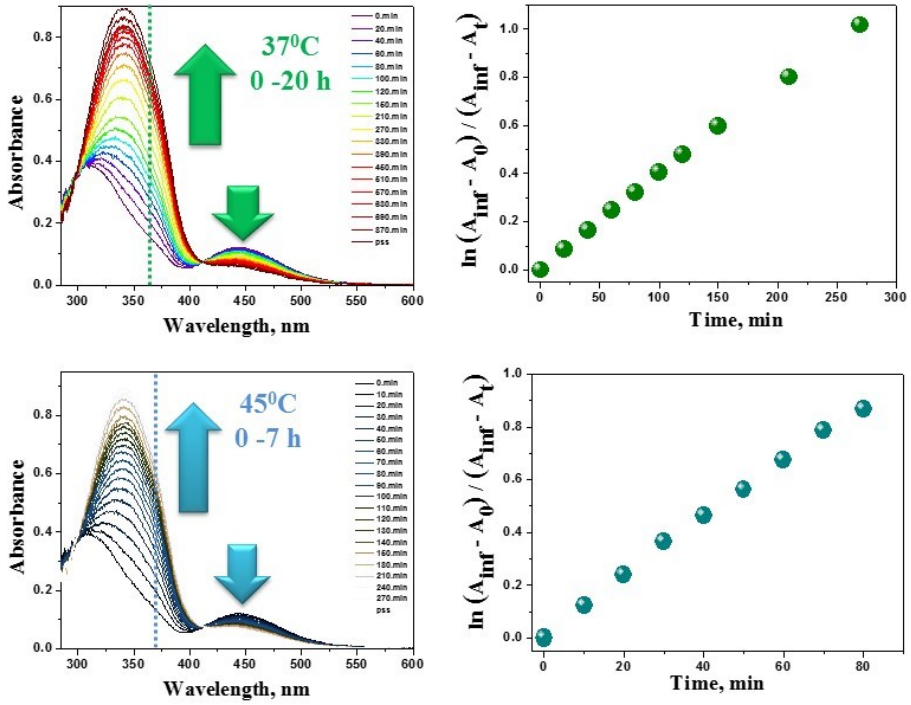


Figure S3b. Estimation of activation energy for the conversion of cis- into trans-form in the dark at various temperature (2) : C3F-Azo-C6H/SSA Film, adsorbed amount of C3F-Azo-C6H is 4.2 eq. vs CEC.

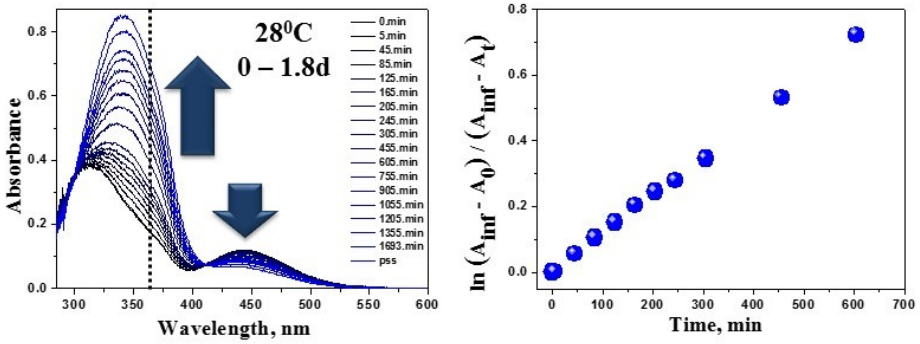


Figure S3c. Estimation of activation energy for the conversion of cis- into trans-form in the dark at various temperature (3) : C3F-Azo-C6H/SSA Film, adsorbed amount of C3F-Azo-C6H is 4.2 eq. vs CEC.

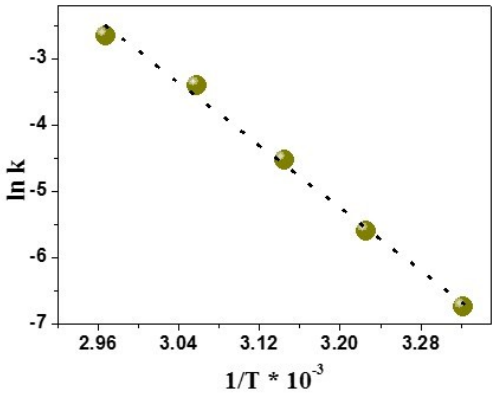


Figure S3d. Estimation of activation energy for the conversion of cis- into trans-form in the dark. Arrhenius plot for C3F-Azo-C6H/SSA Film, adsorbed amount of C3F-Azo-C6H is 4.2 eq. vs CEC.

In ethanol, C3F-Azo-C6H – monomeric form

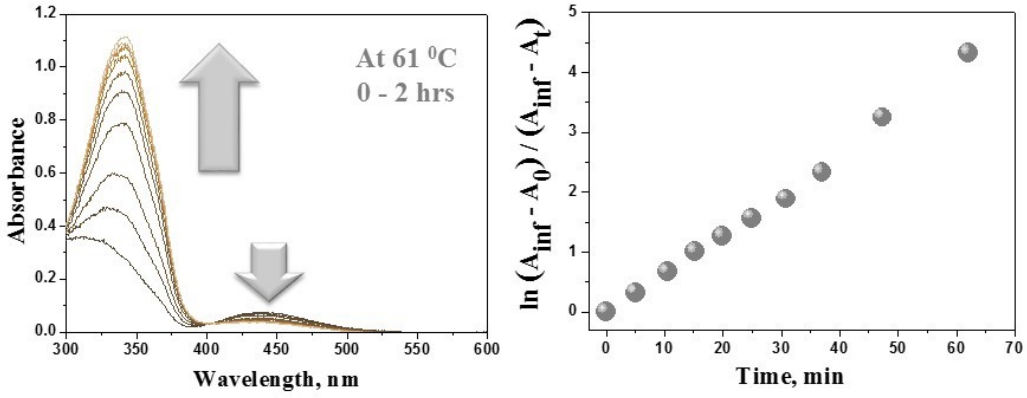


Figure S3e. Estimation of activation energy for the conversion of cis- into trans-form in the dark at various temperature (4) : C3F-Azo-C6H in ethanol. [C3F-Azo-C6H] = 4.17 x 10^{-5} M

In ethanol, C3F-Azo-C6H – monomeric form

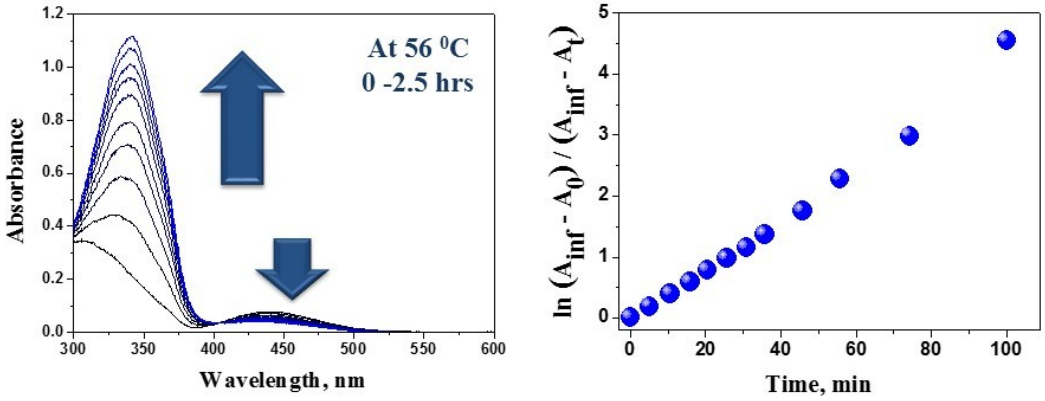


Figure S3f. Estimation of activation energy for the conversion of cis- into trans-form in the dark at various temperature (5) : C3F-Azo-C6H in ethanol. [C3F-Azo-C6H] = 4.17 x 10^{-5} M

In ethanol, C3F-Azo-C6H – monomeric form

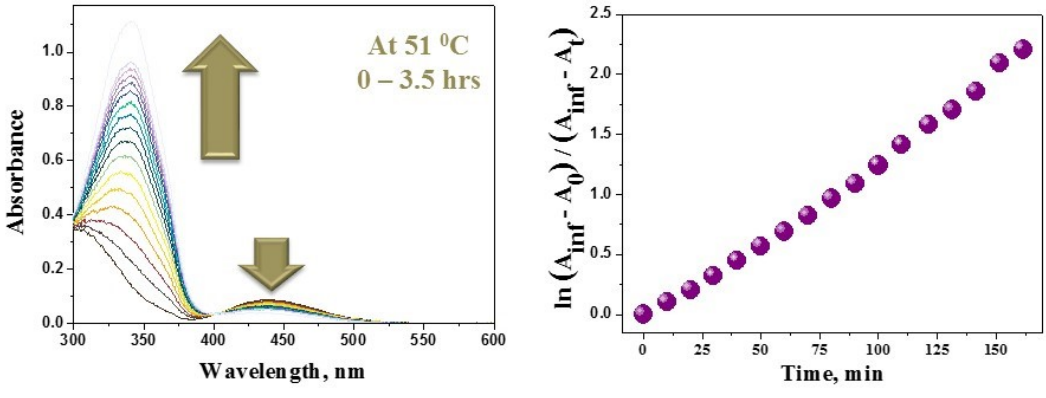


Figure S3g. Estimation of activation energy for the conversion of cis- into trans-form in the dark at various temperature (6) : C3F-Azo-C6H in ethanol. [C3F-Azo-C6H] = 4.17 x 10^{-5} M

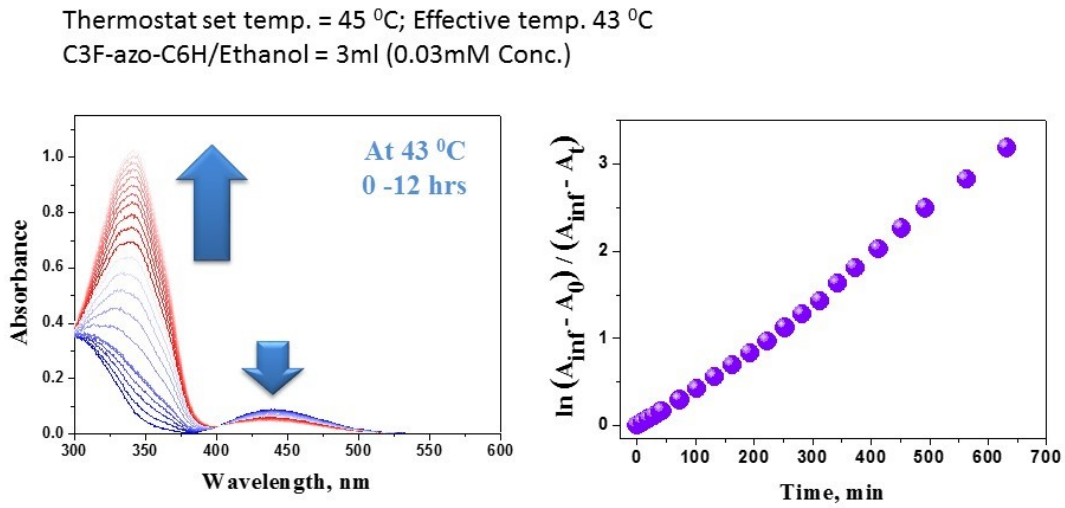


Figure S3h. Estimation of activation energy for the conversion of cis- into trans-form in the dark at various temperature (7) : C3F-Azo-C6H in ethanol. [C3F-Azo-C6H] = 4.17 x 10^{-5} M

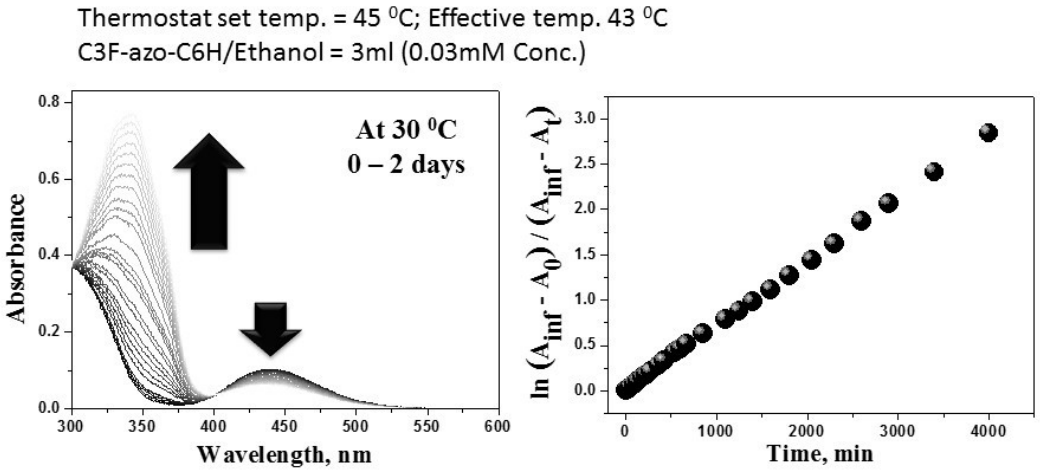


Figure S3i. Estimation of activation energy for the conversion of cis- into trans-form in the dark at various temperature (8) : C3F-Azo-C6H in ethanol. [C3F-Azo-C6H] = 4.17 x 10^{-5} M

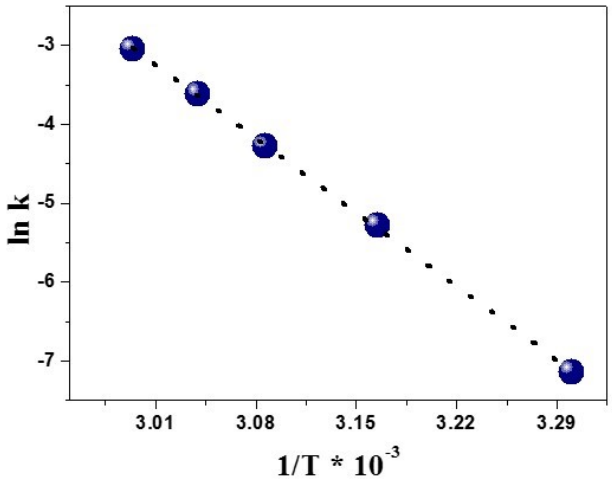


Figure S3j. Estimation of activation energy for the conversion of cis- into trans-form in the dark. Arrhenius plot for C3F-Azo-C6H in ethanol C3F-Azo-C6H in ethanol: [C3F-Azo-C6H] = 4.17 x 10^{-5} M

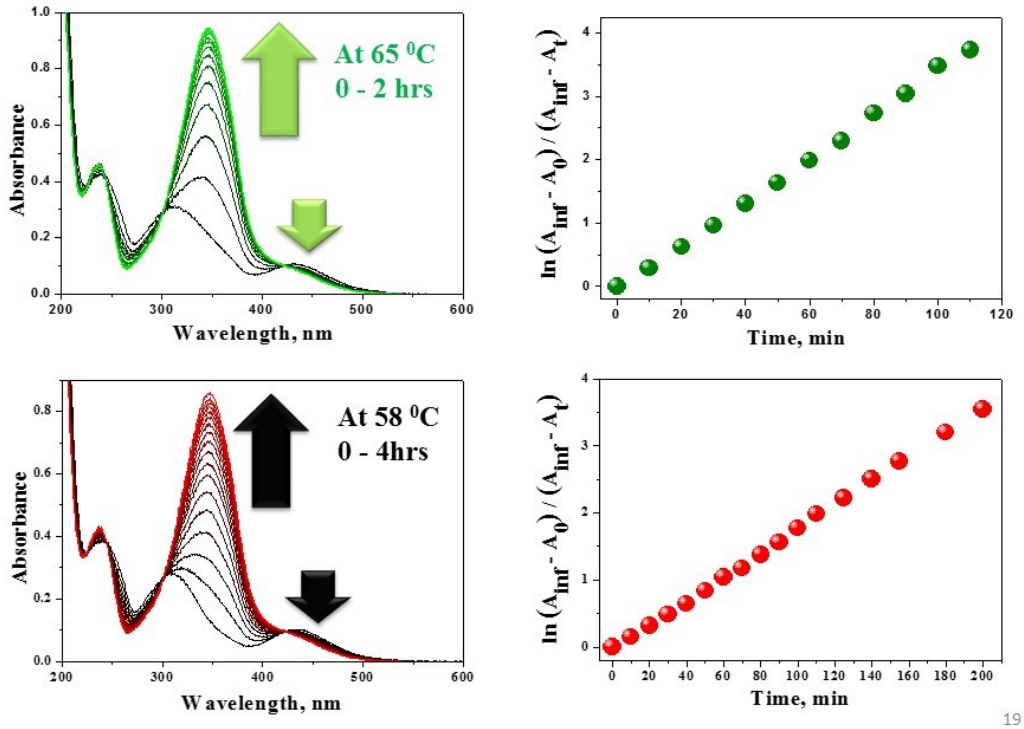


Figure S3k. Estimation of activation energy for the conversion of cis- into trans-form in the dark at various temperature (9) : C3F-Azo-C6H micelle in water. [C3F-Azo-C6H] = 3.33 x 10^{-5} M

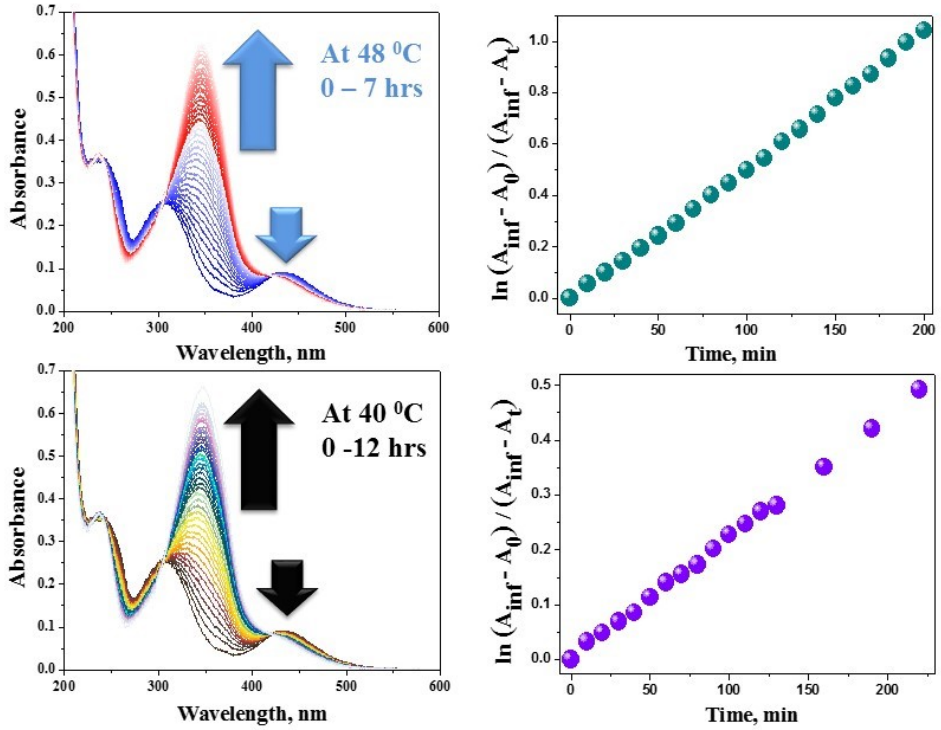


Figure S3l. Estimation of activation energy for the conversion of cis- into trans-form in the dark at various temperature (10) : C3F-Azo-C6H micelle in water. [C3F-Azo-C6H] = 3.33 x 10^{-5} M

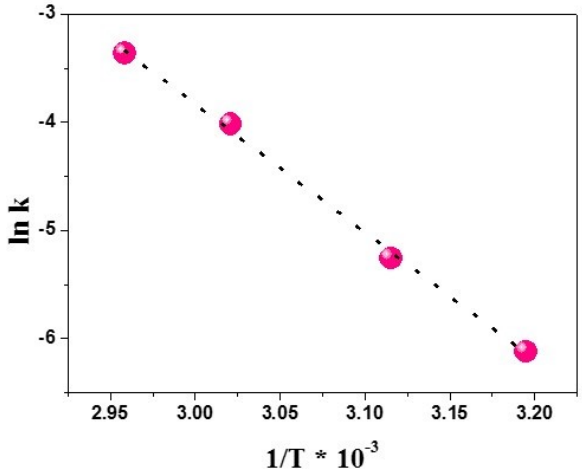
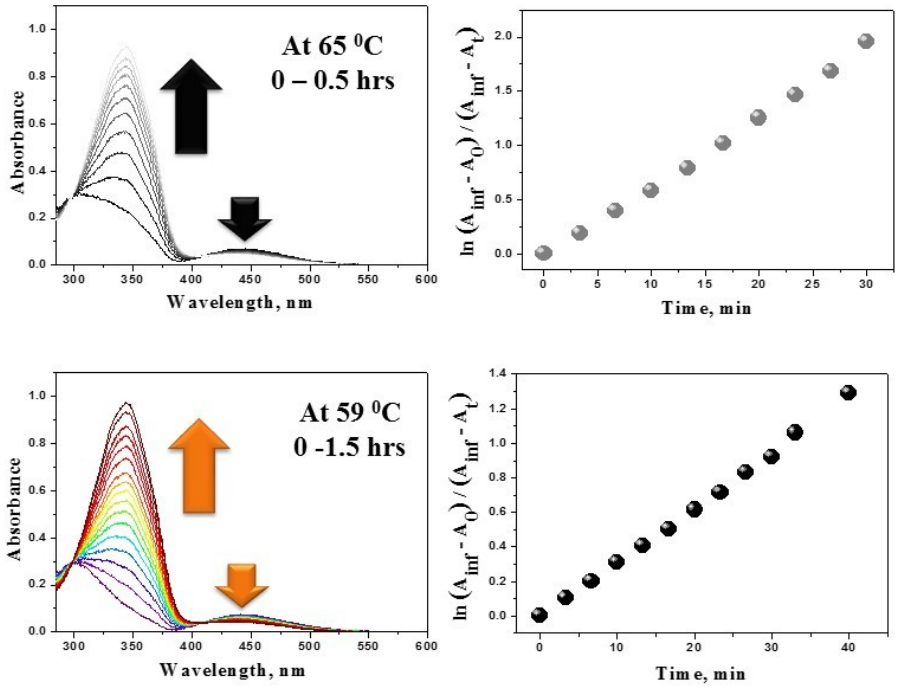
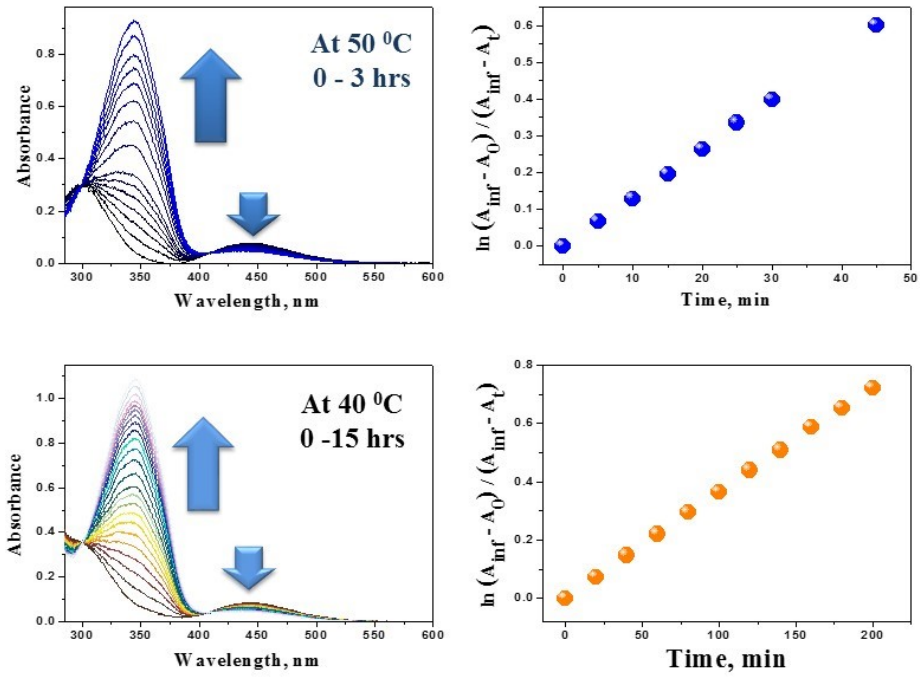


Figure S3m. Estimation of activation energy for the conversion of cis- into trans-form in the dark. Arrhenius plot for C3F-Azo-C6H micelle in water: [C3F-Azo-C6H] = 3.33 x 10^{-5} M



22

Figure S3n. Estimation of activation energy for the conversion of cis- into trans-form in the dark at various temperature (11) : C3F-Azo-C6H/SSA Film swelled with benzene, adsorbed amount of C3F-Azo-C6H is 4.2 eq. vs CEC.



23

Figure S3o. Estimation of activation energy for the conversion of cis- into trans-form in the dark at various temperature (12) : C3F-Azo-C6H/SSA Film swelled with benzene, adsorbed amount of C3F-Azo-C6H is 4.2 eq. vs CEC.

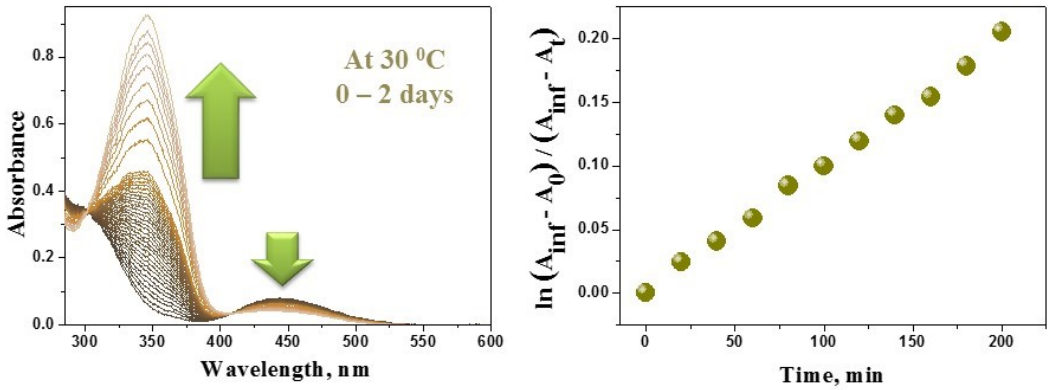


Figure S3p. Estimation of activation energy for the conversion of cis- into trans-form in the dark at various temperature (13) : C3F-Azo-C6H/SSA Film swelled with benzene, adsorbed amount of C3F-Azo-C6H is 4.2 eq. vs CEC.

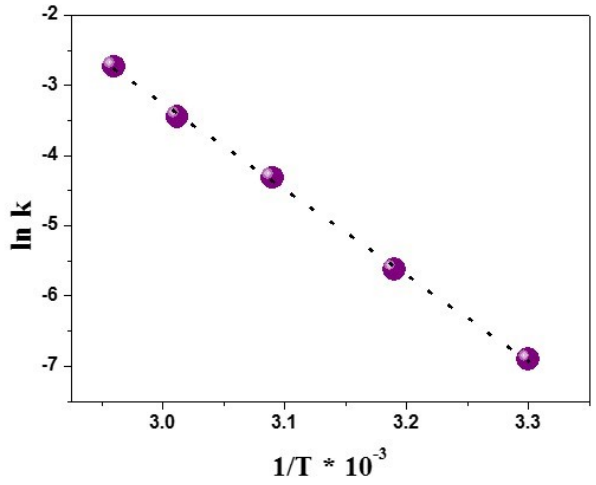


Figure S3q. Estimation of activation energy for the conversion of cis- into trans-form in the dark. Arrhenius plot for C3F-Azo-C6H/SSA Film swelled with benzene, adsorbed amount of C3F-Azo-C6H is 4.2 eq. vs CEC.