

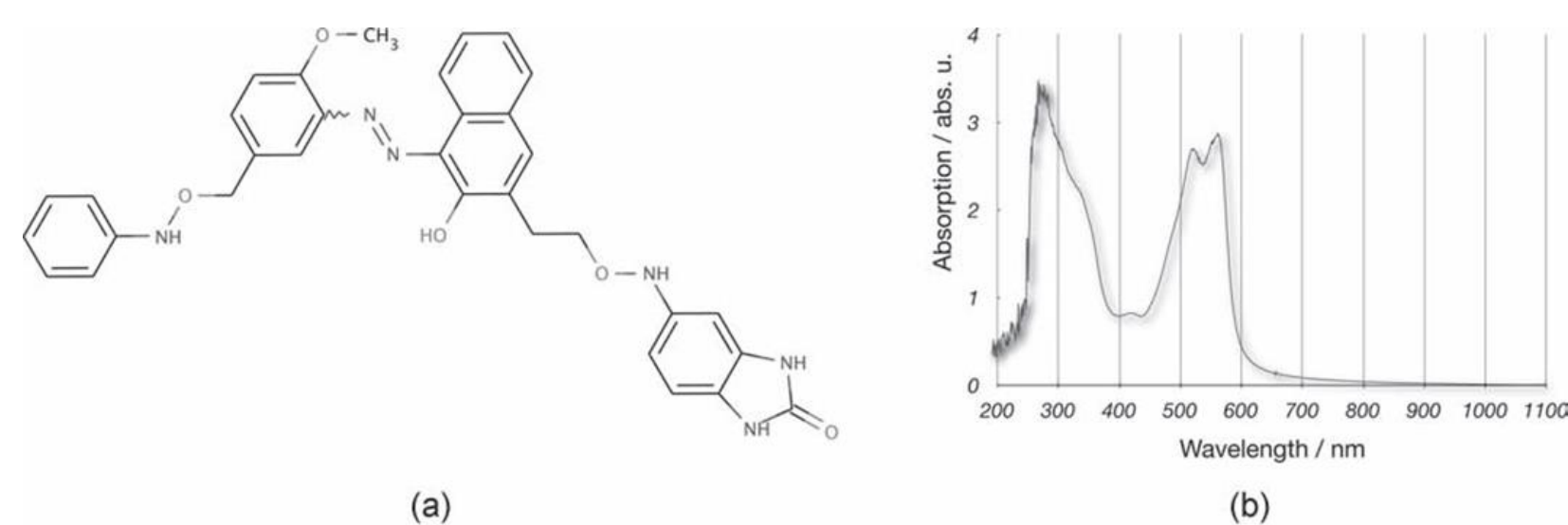
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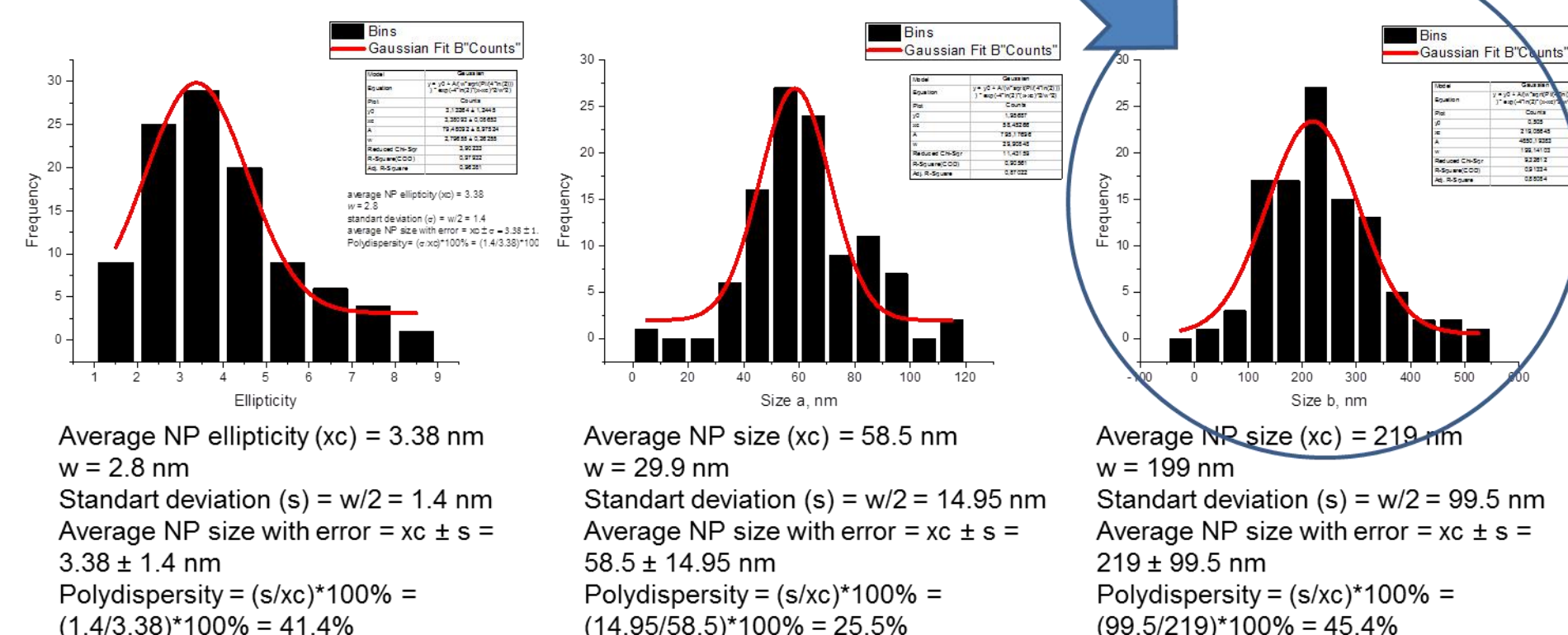
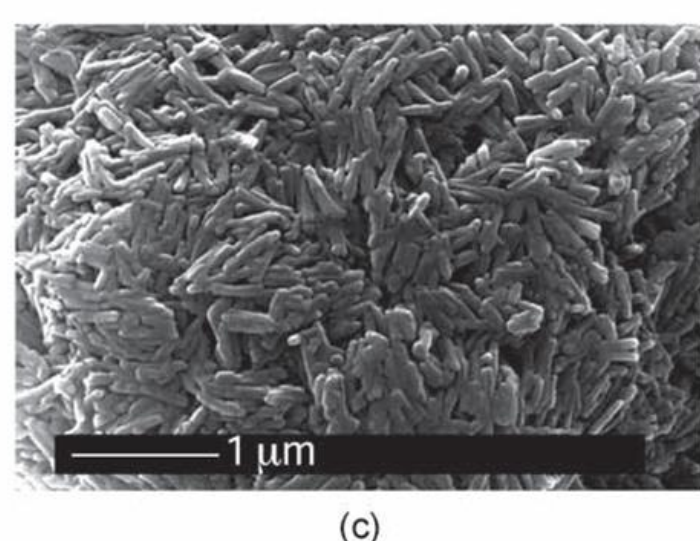
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The dispersions of Pigment Red 176 nanorods in liquid crystals and dodecane [1,2] were fabricated and their electro-optical properties have been studied. We report the investigation of the light transmittance as a function of applied voltage, frequency, concentration of pigment and geometry of the electrodes in the cells. The birefringence and dichroism induced by ac field were investigated within a high frequency range ranges. The obtained results clearly show a great potential of dispersions of Pigment Red 176 nanoparticles for their applications in advanced optical and nonlinear optical devices.

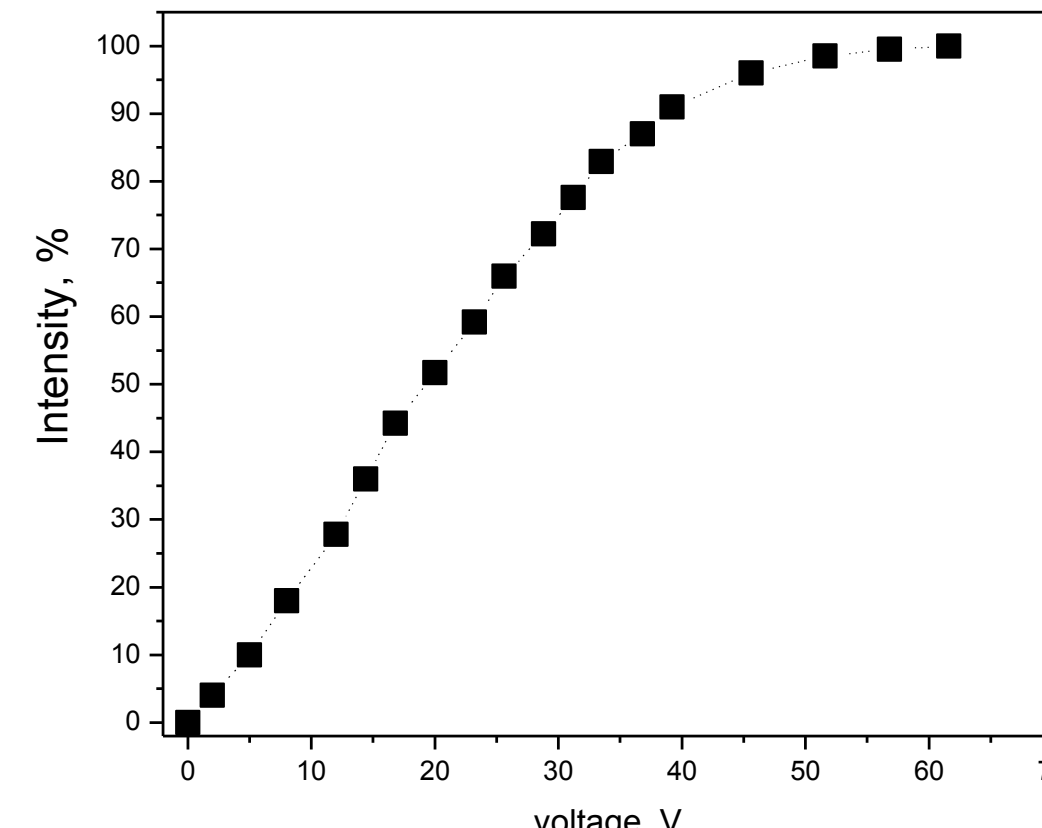
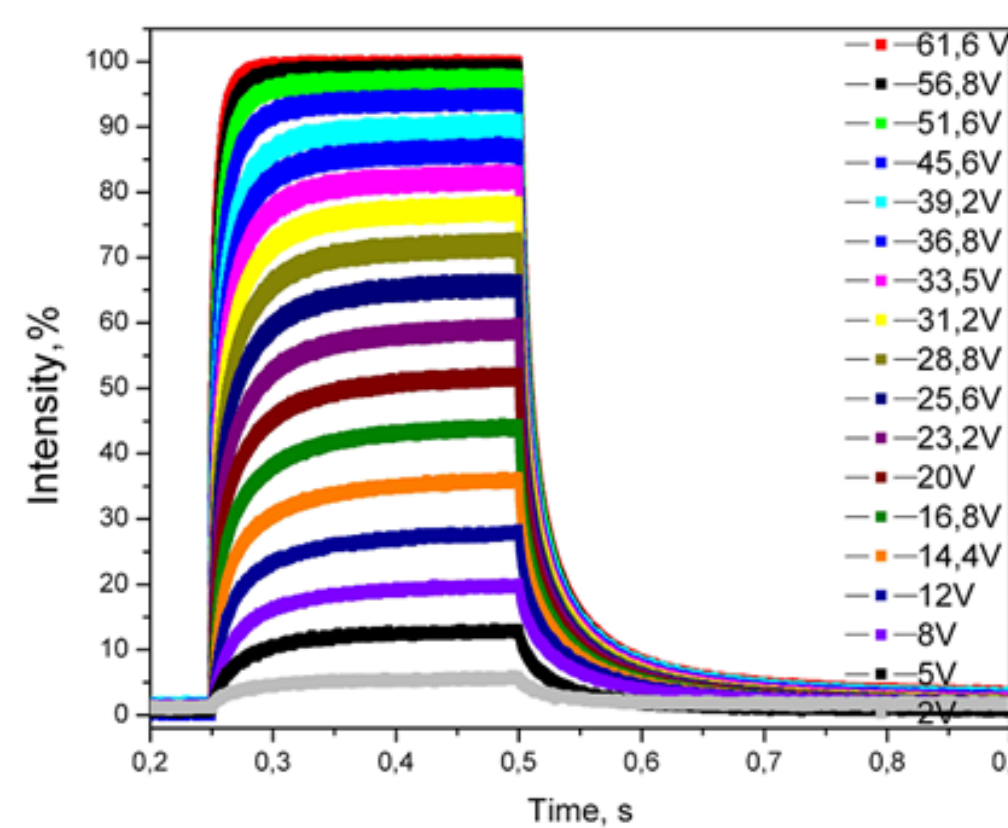
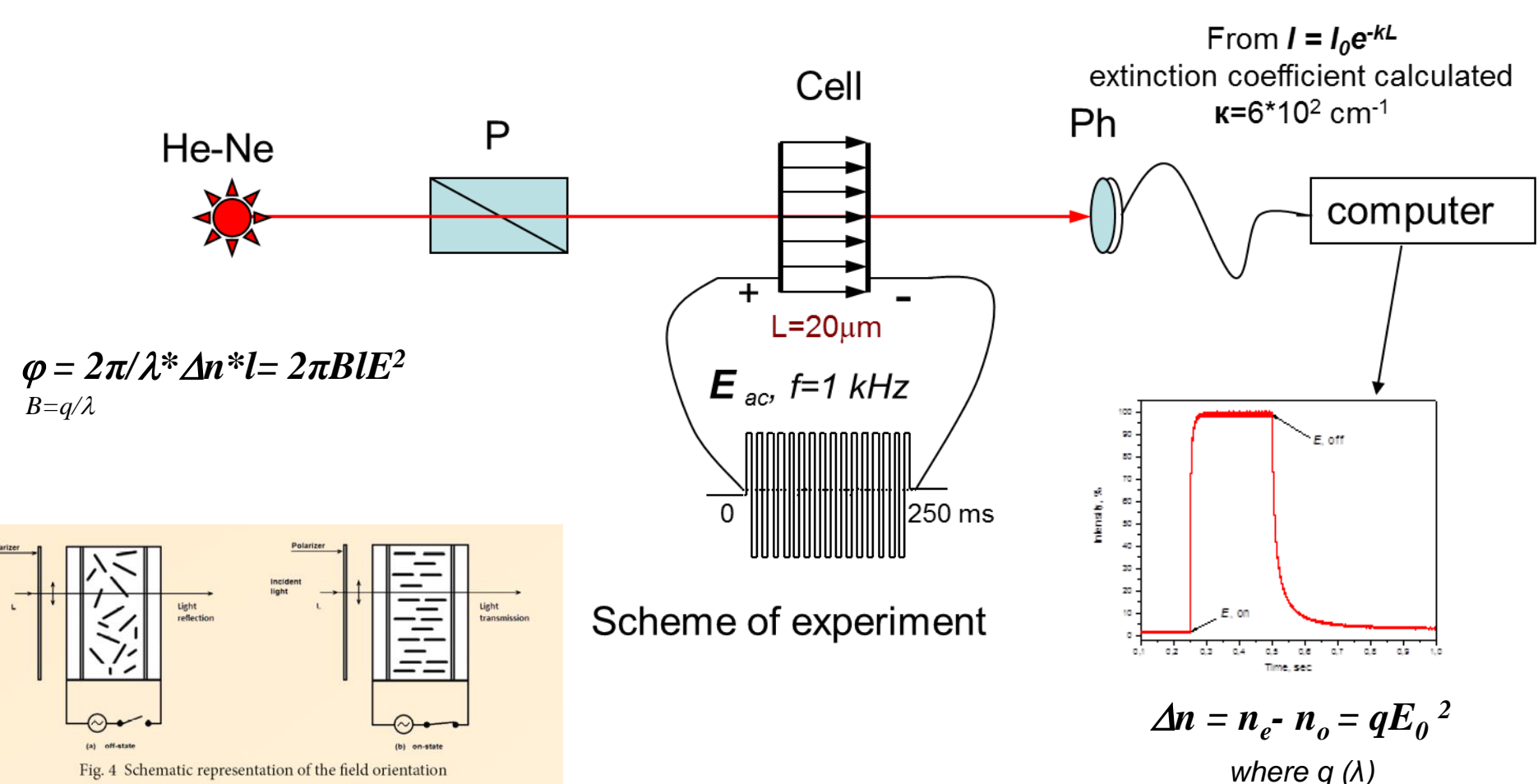


[3]

a) Chemical formula PR 176
 b) Absorbance spectrum
 c) SEM photo of pigment



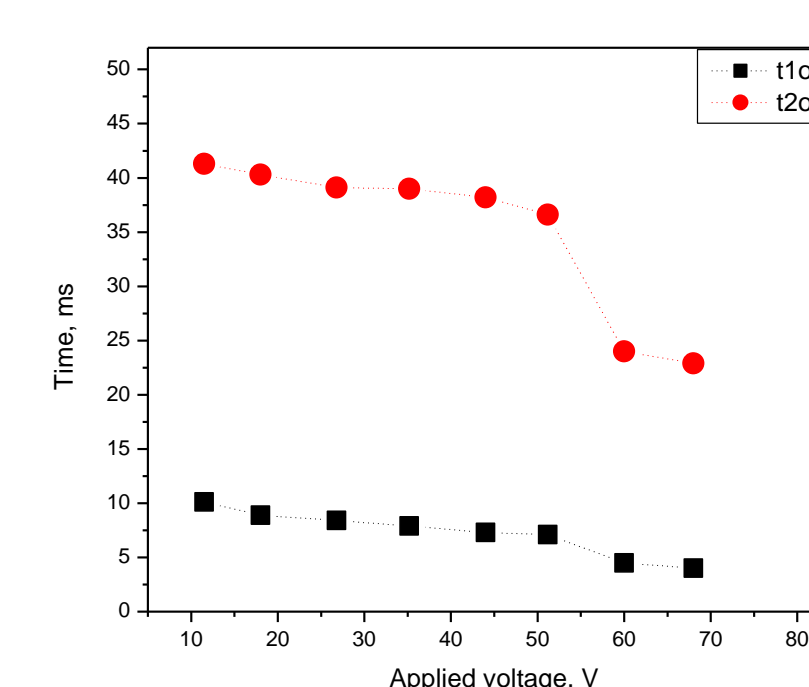
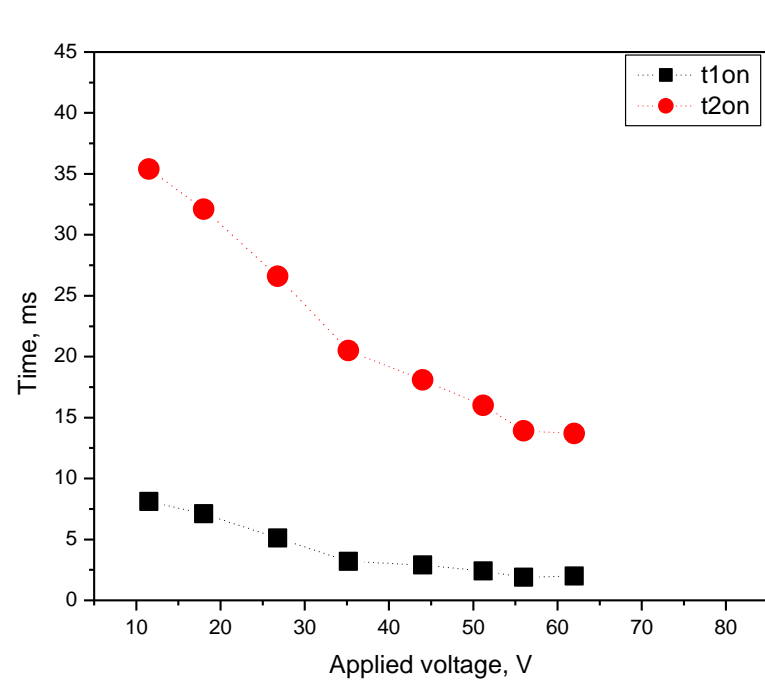
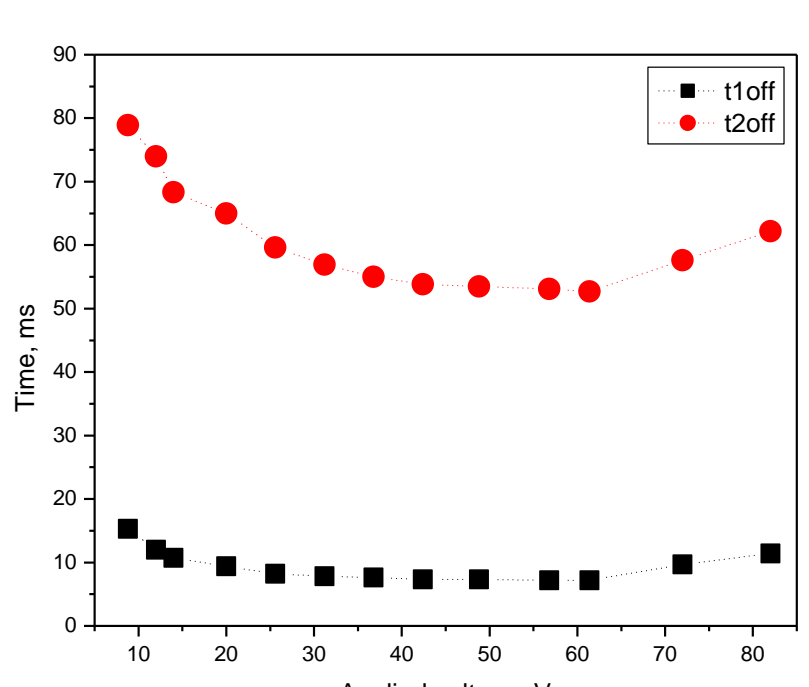
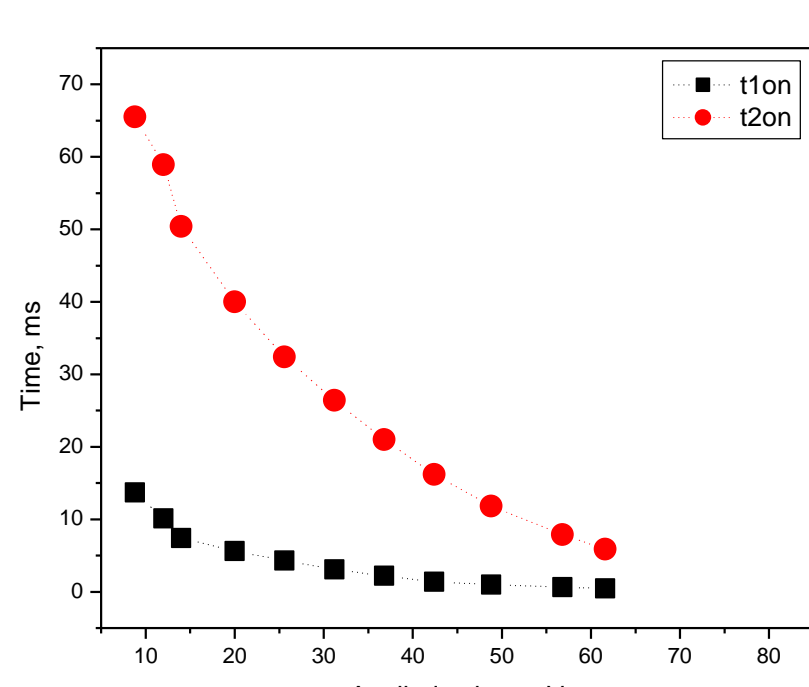
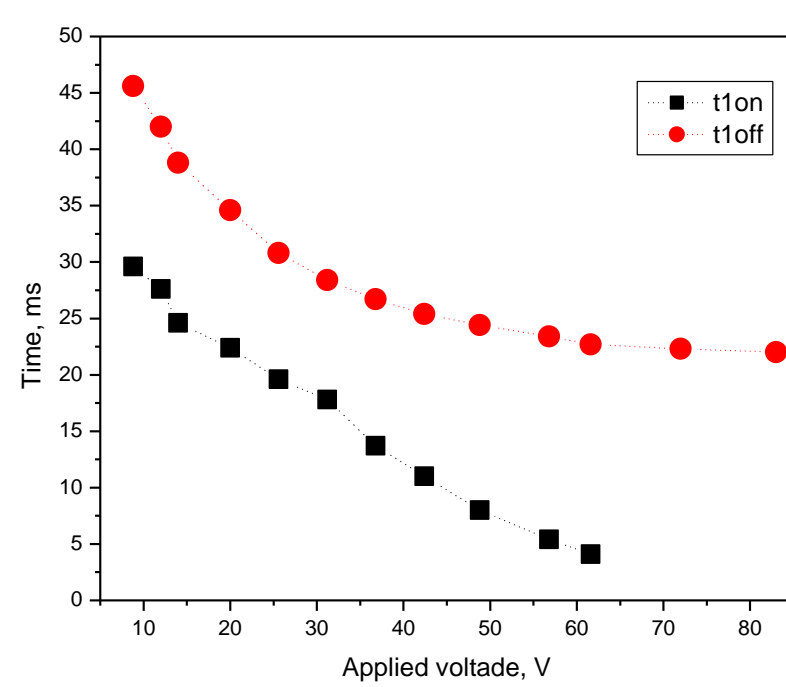
Kerr effect (dichroism) PR 176 10% in dodecan by applied ac electric field measured



Results of calculation for $y=y_0+A_1\exp(-x/t_1)$ for 1 kHz

Results of calculation for $y=y_0+A_1\exp(-x/t_1)+A_2\exp(-x/t_2)$ (for 1 kHz)

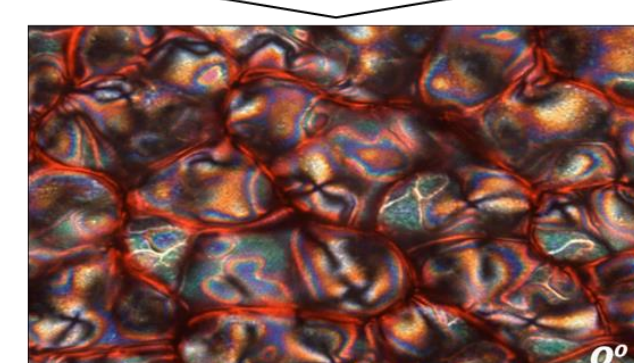
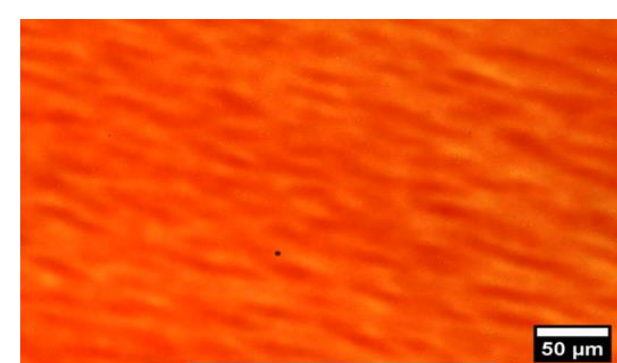
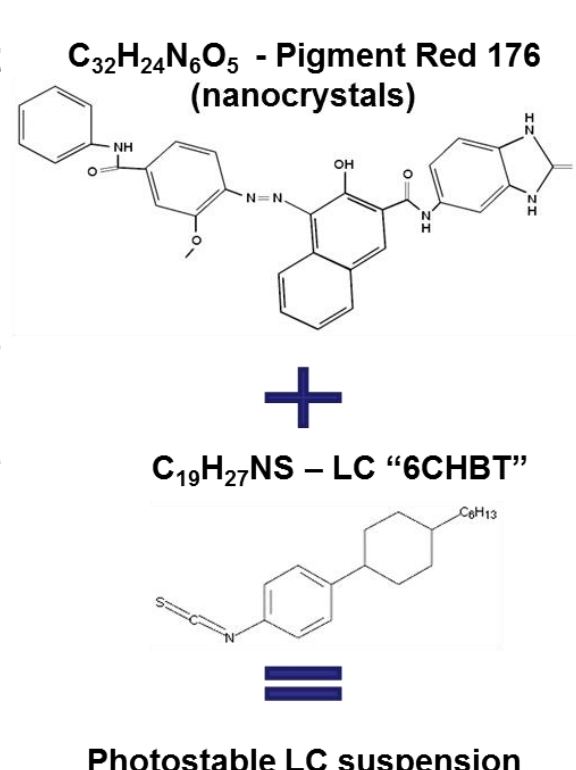
Results of calculation for $y=y_0+A_1\exp(-x/t_1)+A_2\exp(-x/t_2)$ (for 5 kHz)



Conclusions

The dispersions of Pigment Red 176 nanorods in liquid crystals and in dodecane were fabricated and their electro-optical properties have been studied as a function of applied voltage, frequency, concentration of pigment and geometry of the electrodes in the cells. The birefringence and dichroism induced by ac field were investigated within a high frequency ranges. The detailed birefringence study showed that the contribution of the permanent dipole moment μ of the nanorods to the induced order is negligible. On the contrary, the contribution of the excess polarizability ϵ of the particles is large. The high efficiency of the electric field to align the particles and the response times of a few milliseconds, make the dispersions of Pigment Red 176 nanorods in dodecane or LC a promising system for electro-optical applications.

Pigment Red 176 + 6CHBT Liquid Crystal Suspension



The experimental samples of the mini-displays with gomeotropic orientation of the LC suspension (LC+nanoparticles of the dye). The record images and text under the influence laser irradiation is demonstrated.

References

- [1] S. Kredentser et al, Photonics Letters of Poland, 2015, 7 (4), pp. 91-93
- [2] O. Buluy et al, Journal of Molecular Liquids, 2018, 267, pp. 286-296
- [3] A.Eremin, R. Stannarius, Adv. Funct. Mater. 2011, 21, pp. 556-564

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