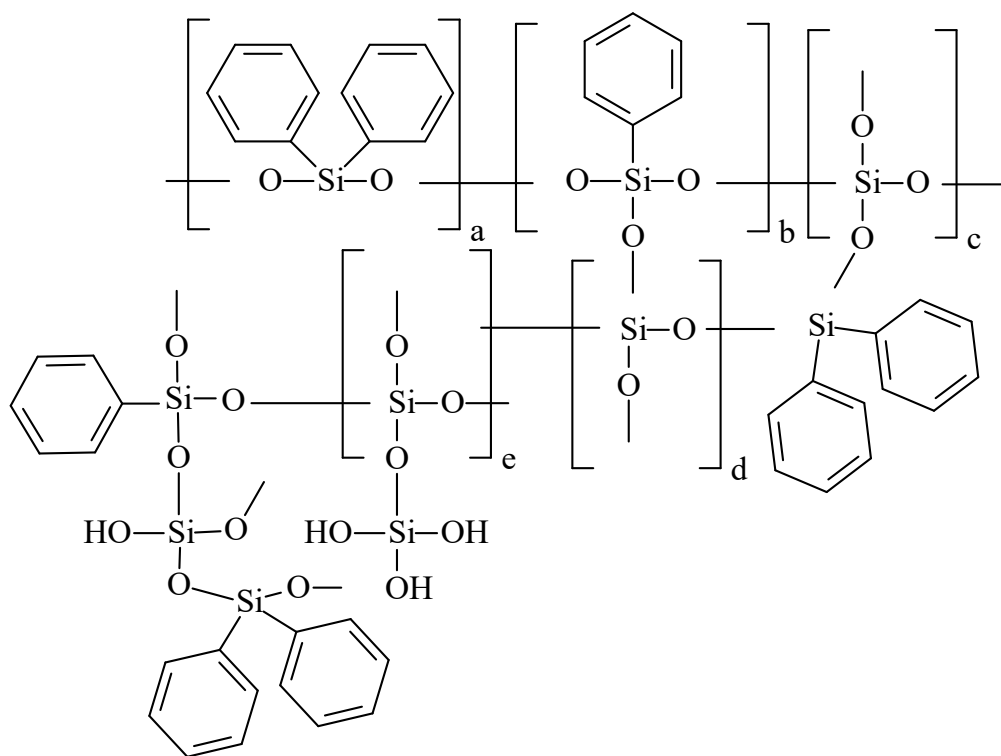


# Optical Behavior of Curcuminoid Hybrid Systems as Coatings Deposited on Polyester Fibers

Florentina Monica Raduly, Valentin Rădițoiu \*, Alina Rădițoiu, Violeta Purcar, Georgiana Ispas, Adriana Nicoleta Frone, Raluca Augusta Gabor and Cristian-Andi Nicolae

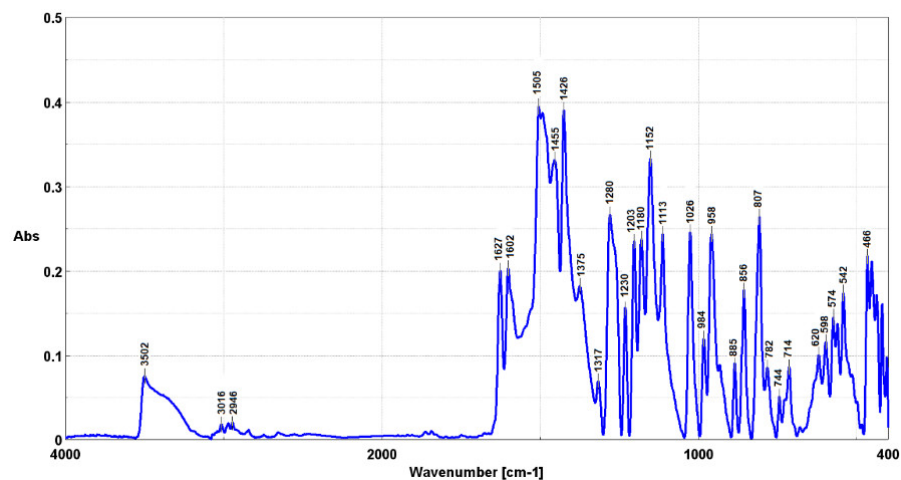
Laboratory of Functional Dyes and Related Materials, National Research and Development Institute for Chemistry and Petrochemistry—ICECHIM, 060021 Bucharest, Romania; monica.raduly@icechim.ro (F.M.R.); coloranti@icechim.ro (A.R.); violeta.purcar@icechim.ro (V.P.); georgiana.ispas23@yahoo.com (G.I.); ciucu\_adriana@yahoo.com (A.N.F.); ralucaagabor@yahoo.com (R.A.G.); ca\_nicolae@yahoo.com (C.A.N.)

\* Correspondence: vraditoiu@icechim.ro



**Scheme S1.** Chemical structure of a hybrid film forming material (P3 blank).

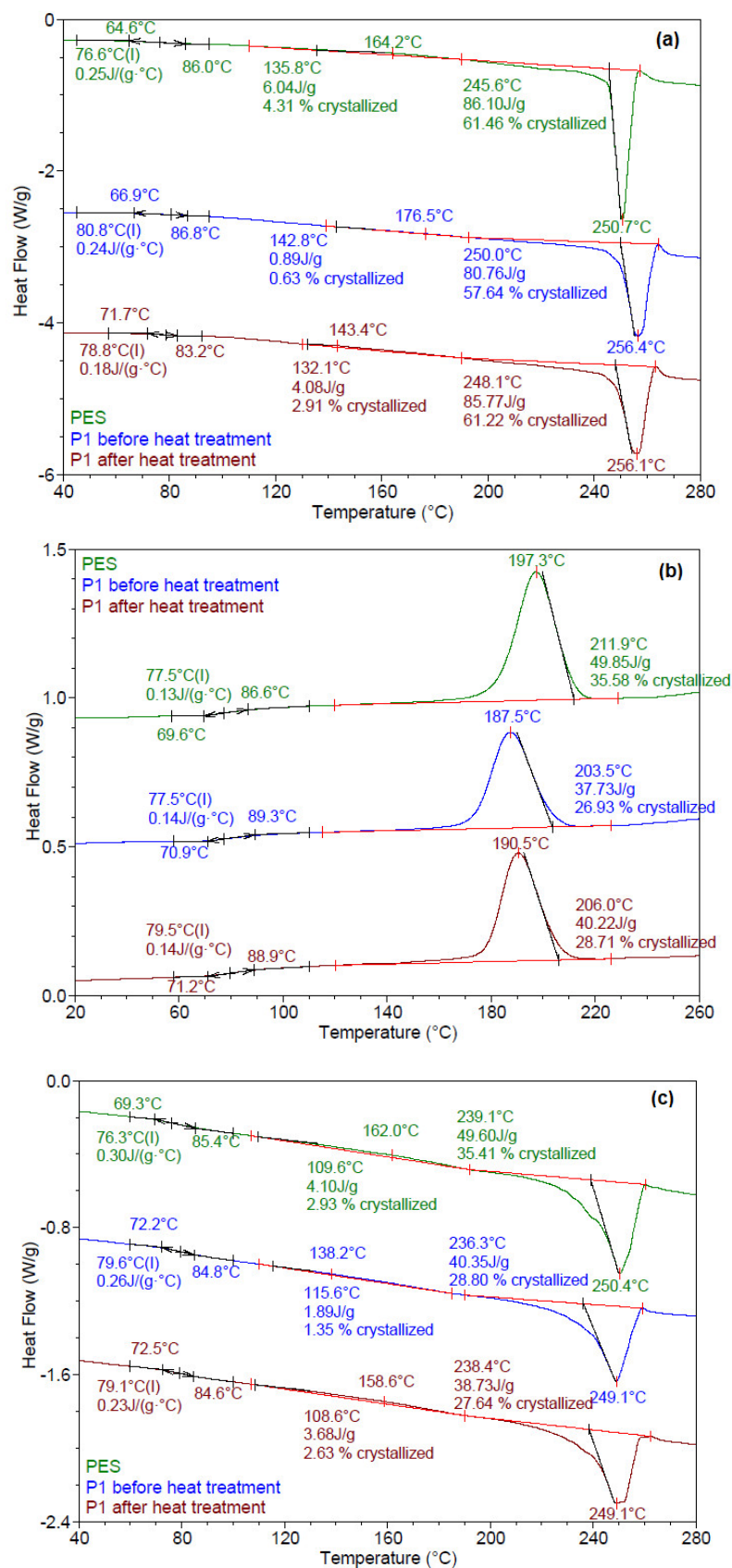
### 3.1. Structural characterization of coated fabrics by FTIR measurements



**Figure S1.** FTIR-ATR spectrum of curcumin.

The characteristic bands of curcumin in infrared spectrum are related to the stretching vibration of phenolic OH groups involved in hydrogen bonds, as a large band located at 3250–3502  $\text{cm}^{-1}$ , while at 3016  $\text{cm}^{-1}$  was found the aromatic C–H stretching vibration. The absorption bands around 2946  $\text{cm}^{-1}$ , attributed to the stretching vibration of methylene group. The intense band located at 1627–1602  $\text{cm}^{-1}$  corresponds to the stretching vibration of C=O, characteristic of  $\alpha,\beta$ -unsaturated compounds. The absorption bands around 1505–1426  $\text{cm}^{-1}$  are associated with the aromatic C=C bonds. In this region are three bands due to skeletal vibrations, the strongest being at 1505  $\text{cm}^{-1}$ . Bands at 1375–1317  $\text{cm}^{-1}$  have been assigned to CH<sub>2</sub> scissoring, while at 1280–1233  $\text{cm}^{-1}$  are located the stretching vibrations attributed to the phenolic C–O group. The aromatic CH out of plane deformation vibrations are found in the range 1113–1026  $\text{cm}^{-1}$  and CH in-plane deformation vibrations are located at 1152–1203  $\text{cm}^{-1}$ . Other structural characteristics can be found presented in detail elsewhere [1].

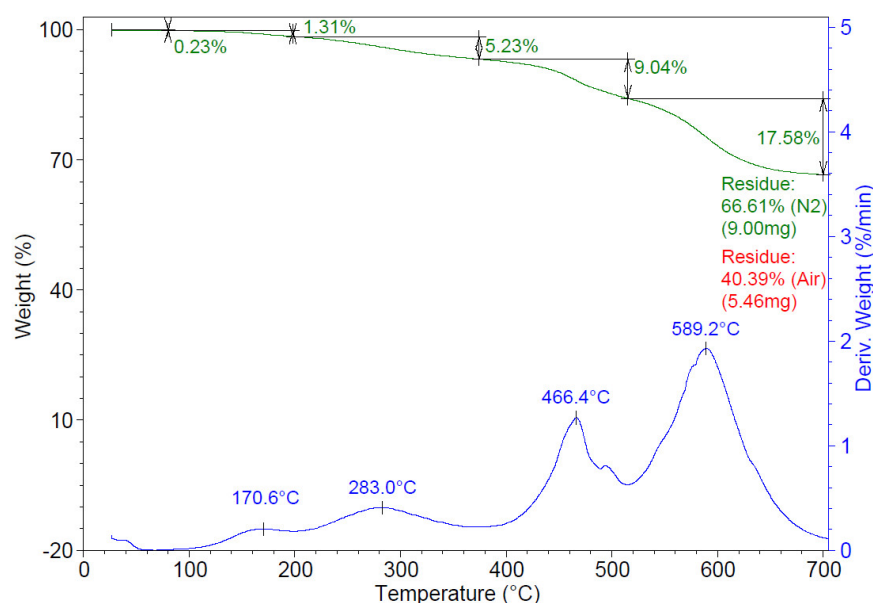
## 3.4. Thermal properties of functionalized polyester



**Figure S2.** Thermal stability of PES fibers and P1 before and after thermal treatment at 120 °C by DSC measurements: (a) 1st heating cycle, (b) 1st cooling cycle, (c) 2nd heating cycle.

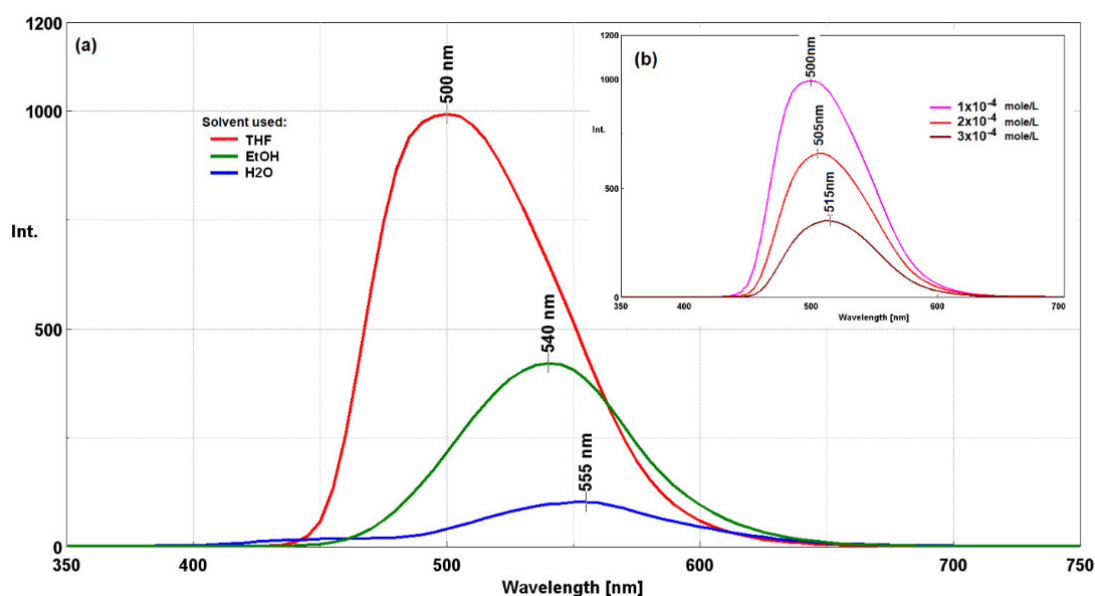
As it can be observed from Figure S2 the DSC measurements show almost identical curves and values (transition temperature and heat of transformation) for all the samples analyzed (PES blank and P1 sample before and after thermal treatment in the fixation oven). From the data it can be observed that PES it is not affected during thermal treatment at 120 °C for 1 h.

The thermofixation temperature was established at 120 °C in order to eliminate all the solvents and water from the sol-gel process, based on the thermogravimetric analysis of the nanosols, as it can be observed from Figure S3.



**Figure S3.** TGA analysis of P3 hybrid material.

### 3.5. Photophysical properties of nanosol coated fabrics



**Figure S4.** Intensity of curcumin fluorescence emission and peak maximum wavelength in solvents with different polarities (a), influence of curcumin concentration on fluorescence emission (b).

Solvents polarity influenced the intensity, position of the fluorescence emission maximum and the symmetry of the emission band, and is due to the interactions established

between solvent molecules and curcumin molecules. Interactions between water molecules and curcumin keto-enol tautomers by hydrogen bonds determine a large band of fluorescence emission having low intensity due to the fluorescence quenching by hydrogen bonds, as it can be observed from Figure S4.

In the case of THF it was observed an asymmetrical emission band, due to the formation of only one type of hydrogen bonds between THF and enol tautomer. In the inset it is clearly seen that increasing the dye concentration the intensity of fluorescence emission due to the interactions between curcumin molecules and the apparition of a new path of fluorescence quenching.

## References

1. Gunasekaran, S.; Natarajan, R.K.; Natarajan, S.; Rathikha, R. Structural Investigation on Curcumin. *Asian J. Chem.* **2008**, *20*, 2903–2913.