

Conclusions

- (1) The study of DSC, FT-IR, electrical conductivity and dielectric properties of the investigated samples of pure PMMA and perylene doped dye clearly showed that the thermally polymerized samples are more stable compared to those prepared by solvent casting. The physical properties of polymers are strongly affected by the acid-base character of the solvent.
- (2) Study of the photo-stability measurements showed the long term stability of the dye for thermally polymerized samples. In the solvent cast samples the dye reduced by 90% after 2 weeks exposure to sunlight.
- (3) Study of the optical absorption of PMMA showed a decrease in the optical gap for doped samples prepared by thermal polymerization, which is attributed to the caging of dye molecules between the polymer chains.
- (4) Preparation of PMMA/perylene by thermal polymerization reduces the strong UV degradation of both the polymer and dye.
- (5) Fluorescence spectra investigated showed that the lower concentration (6.33×10^{-5} mol.%) results in the highest fluorescence intensity and a red shifted spectrum and consequently the highest optical efficiency.
- (6) The long exposure of FSCs to sun light for one season (Summer) showed the decrease of the fluorescence quantum yield and a new

fluorescence band appears due to the formation of dimers exists in the excited state (excimers).

- (7) Spectral distribution of solar radiation for different air masses, spectral response of solar cells and fluorescence characteristics allow the determination of the optimum dye concentrations and optical efficiency of FSCs.
- (8) The better utilization of the FSCs is achieved in the morning and near the sunset due to high diffuse light.
- (9) The main advantage of FSCs is the reduction of the area to be covered by solar cells to the area of the collector edges.