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## Non-linear optics of nano-scale pentacene thin film

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### Abstract

We have found the new ways to investigate the linear/non-linear optical properties of nanostructure pentacene thin film deposited by thermal evaporation technique. Pentacene is the key material in organic semiconductor technology. The existence of nano-structured thin film was confirmed by atomic force microscopy and X-ray diffraction. The wavelength-dependent transmittance and reflectance were calculated to observe the optical behavior of the pentacene thin film. It has been observed the anomalous dispersion at wavelength  $\lambda < 800$  nm, whereas the normal dispersion was found at wavelength  $\lambda > 800$ . The non-linear refractive index of the deposited films was investigated. The linear optical susceptibility of pentacene thin film was calculated, and we observed the non-linear optical susceptibility of pentacene thin film at about  $6 \times 10^{-13}$  esu. The advantage of this work is to use of spectroscopic method to calculate the liner and non-liner optical response of pentacene thin films rather than expensive Z-scan. The calculated optical behavior of the pentacene thin films could be used in the organic thin films base advanced optoelectronic devices such as telecommunications devices.

### Keywords

**KeyWords Plus:** [FIELD-EFFECT TRANSISTORS](#); [CONSTANTS](#); [ROUGHNESS](#); [SUSCEPTIBILITIES](#); [PERFORMANCE](#)

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