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Characterization of Phenanthrene Single Crystals

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Abstract: Single crystals of phenanthrene were successfully grown from melt using Bridgeman Crystal Growth System Type 365. The starting material was purified by sublimation and zone refining techniques in specially designed crystal growth tubes. Phenanthrene single crystals grow with the plane of maximum growth corresponding to the ab-crystallographic plane, and cleave readily in this plane. The optical absorption spectra of phenanthrene single crystals and phenanthrene crystals dissolved in benzene, alcohol and acetone solutions were studied in the wavelength range (200 - 400 nm). The optical excitations i.e., $(\pi - \pi^*)$ transitions, are attributed to the weak and strong optical absorption in such crystals, and crystals dissolved in different solutions. The region of strong absorption shows three absorption bands (^1C_b) , (^1B) and (^1L_a) while (^1L_b) band refers to weak absorption region. The optical bandgap energy of these crystals was found to be 3.16 eV and for crystals dissolved in different solutions was found to vary from 3.72 eV to 3.78 eV and is in agreement with other published data.

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