A.13: Irradiation of Lexan film by DC Accelerator

Researchers at Mangalore University are working to study the changes in optical, dielectric, thermal, structural, and surface morphological properties of Lexan film due to electron beam irradiation. Lexan is the trademarked name of the polycarbonates, a particular group of thermoplastic polymers. They are easily worked, moulded, and thermoformed. Because of these properties, polycarbonates find many applications where abrasion, chemical and weather resistance are important. In addition it can be laminated to make bullet-proof "glass", such as used in bullet-resistant windows in automobiles.

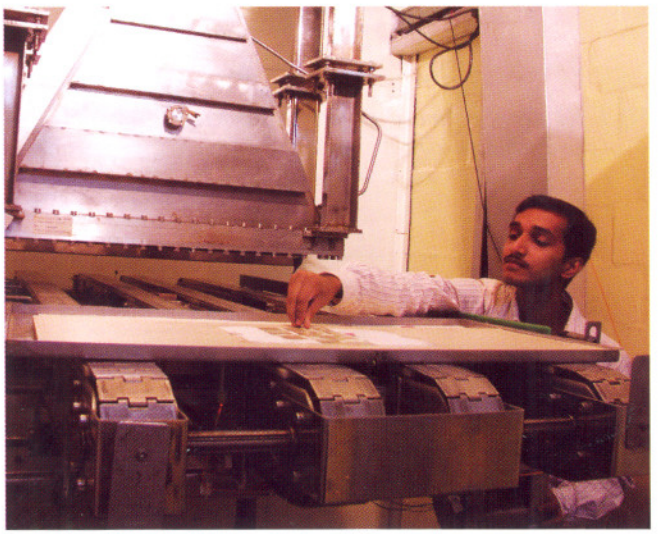

Fig. A.13.1: Lexan films on process tray on conveyor belt.

The irradiation of the Lexan film (thickness 200 μm) was done with 500 keV electron beam of a DC accelerator at RRCAT. Irradiation doses in the range of 50 kGy to 1000 kGy were delivered.

The dosimetry for the process was done using B3 radiochromic films and the required beam current and conveyor speed to deliver the required dose of 4.5 kGy in one pass was determined. Higher doses were given to the samples by increasing the number of passes. The achieved dose uniformity at 500 keV was within ±5% for scanning width of 500 mm.

The samples to be irradiated were placed in the process trays at one end of the conveyor belt and were made to pass through the electron beam as shown in Fig. A.13.1.

Further study of effect of irradiation, as a function of the electron dose, on various physical and optical properties of the film such as maximum molar absorption coefficient, absorption cross-section, transition probability, dipole strength, transition dipole moment, dipole length, oscillator strength, optical band gap and activation energy, has been done at Mangalore University.

These results also showed a new possibility of use of Lexan films as radiation dosimeter in the dose range of 50 kGy to 1000 kGy.

Contribution from the colleagues of Power Supply and Industrial Accelerator Division is acknowledged.

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