

§5. Study of Leakage X Rays Measurement by Imaging Plate

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Imaging plate (IP) is used in the field of radiography in stead of X ray films. We examined the basic characteristics of IP in order to apply to measurement of leakage X rays from ECH etc. Leakage radiation measurement is important not only for radiation safety but also for evaluation of condition of machine.

The Imaging plate system we use is GS-525 which is produced by Bio-Rad Lab. Inc.. The system includes plates, eraser, reader and personal computer which controls reader and data analyses. The sensitive area of a plate is 35 cm x 43 cm. Usually, sensitive area is shielded the light with aluminum plate cover. When IP is used for autoradiography, the cover is removed and the sample is set to the surface of IP. In this study, we use IP for measurement with Al cover.

(1) Energy dependence ; The energy response of IP was tested with gamma ray sources ²⁴¹Am, ¹³⁷Cs and ⁶⁰Co. The activities of the sources were about 3 MBq. The source was set to the center of each plate for one week. The distance from the source to the surface of IP was 28 mm. Fig. 1 shows the result of energy dependence. Though this result is not corrected fading effect yet, when the count from ²⁴¹Am is normalized as 1, the responses of ¹³⁷Cs and ⁶⁰Co are 0.22, 0.11, respectively.

(2) Fading ; Recorded radiation effect on IP is faded out. After the same irradiation as mentioned in (1), IP were left before reading for 0, 1, 2, 3 and 7 days. The read out signals were decreased due to fading as shown in Fig. 2.

(3) Sensitivity of different IP ; We evaluated the sensitivities among 10 plates by means of X ray generator, voltage and current of the tube was 9.5

kV and 0.195 mA, respectively. IP was exposed for 20 minutes. Counts in 15 mm diameter area on IP were compared each other. Fig. 3 shows the ratio of sensitivity with the same Al cover.

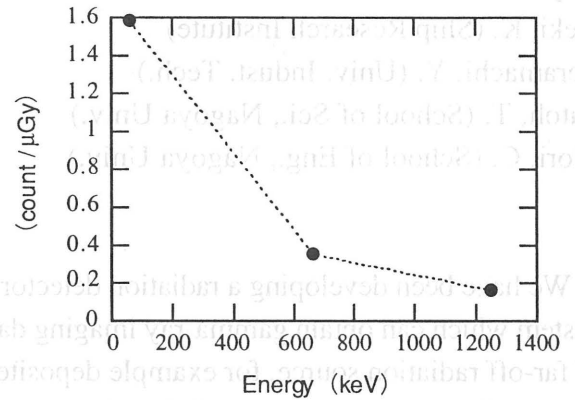


Fig. 1. Energy dependence of IP.

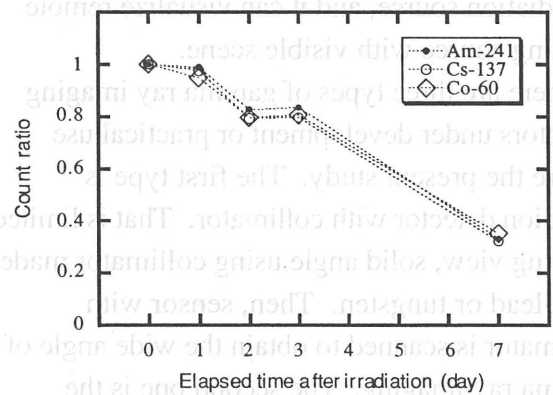


Fig. 2 Decreasing signal due to fading.

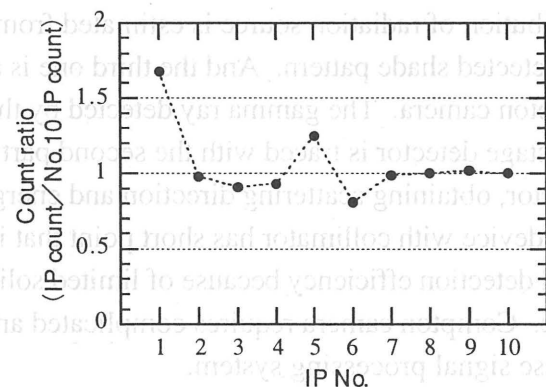


Fig. 3 Different sensitivity among 10 plates with the same Al cover.