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THERMOLUMINESCENCE OF LiF:Mg AS A FUNCTION OF R

by

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A sample of LiF:Mg (66ppm Mg by spectrographic analysis)* was ground and sieved to obtain a powder between 70 and 180 mesh Tyler. The powder was annealed for one hour at 400° C and quenched rapidly in air to 15° C by pouring onto a large aluminum block. To facilitate handling, small gelatin capsules were filled with enough powder to obtain four measurements per capsule. Each capsule was irradiated to a known dose with a ¹³⁷Cs source, using 5mm of lucite to insure uniform electron buildup. The TL was measured within ten minutes after irradiation. Four glow curves were recorded at each irradiation level using an EMI 6256 photomultiplier, a Keithley 610A electrometer, and a Moseley X-Y recorder. Fig. 1 shows a typical glow curve. The 210° C peak occurs at approximately the same temperature as the principal dosimetry peak TLD-100 LiF*. These curves were integrated with a planimeter and averaged to obtain TL as a function of R. The data, normalized to unity at 100R, are shown in Fig. 2. This material is about a factor of thirty less sensitive to radiation than the standard dosimeter material TLD-100 LiF. In addition it would not be as satisfactory for dosimeter purposes as its main glow peak occurs at a low temperature and is less stable. Fig. 3 shows the TL/R

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as a function of R. Errors are estimated to be less than 5%. Additional work to fit these data with the mathematical model⁽¹⁾ is in progress.

* Purchased from Harshaw Chemical Co., Cleveland, Ohio.

- (1) Cameron, J.R., and Zimmerman, D.W. - TL vs R in LiF: A Proposed Mathematical Model - AEC Report C00-1105-102 (1965).

Fig 1

Typical Glow Curve

LiF:Mg (66ppm)

$10^3 R$, Temperatures
are approximate

Luminescence in Arbitrary Units

$\frac{TL}{R}$

3

2

1

0

$10^2 R$

$10^3 R$

$10^4 R$

$10^5 R$

$10^6 R$

Fig 3

LiF Mg (66 ppm)