Dependence of the peak shift, peak height and FWHM of thermoluminescence peaks on the heating rate and trap parameters

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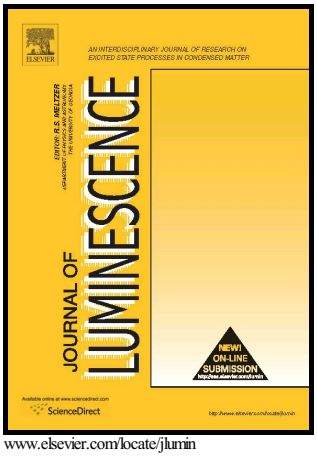

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Abstract

The temperature shift of the maximum TL intensity towards higher temperatures with increasing heating rate is a well known phenomenon. The explanation of such phenomenon is qualitatively understandable. In the present work we predict the temperature shift of the peak intensity quantitatively by analyzing synthetic general-order glow peaks. The obtained expression correlates the temperature shift with the heating rate and the trap parameters. Similar expressions to predict the peak height and the full width at half maximum (FWHM) at higher heating rates are also given. The errors involved in applying these expressions are within the expected experimental errors. The obtained expressions resulted in two new versions of the existing various heating rates methods to evaluate the activation energy which can be used irrespective of the order of kinetics. One of these methods was applied to the TL data of LiF:Mg,Ti and Al_2O_3:C and shows excellent agreement with the published values for the activation energy. In addition, a new expression to correct for the temperature lag was given which shows little improvement in predicting the correct peak temperature when compared with the existing one.

Keywords: Glow peak shift; Heating rate; Activation energy; Temperature lag.