Investigation of Cu$^{2+}$ impurity effect on thermoluminescence properties of LiF: Mg, Cu, P

F Torkzadeh 1, S S Amini 1, and M Fugger 2

1. Nuclear Science Research School, Nuclear Sciences and Technology Research Institute, Atomic Energy Organization of Iran, P.O. Box: 14166-1339, Tehran, Iran
2. Atomic Institute Vienna of Austrian Universities, Thermoluminescence Laboratory, Schuettel Strasse, Vienna, Austria
E-mail: ftorkzadeh@aeoi.org.ir

(Received 18 February 2013 ; in final form 29 June 2013)

Abstract
Thermoluminescence TL materials LiF(Mg,Cu$^{2+}$) and LiF(Cu$^{2+}$) were produced in powder. Their 3D emission spectra were investigated and compared to the commercially available LiF(Mg,Cu$^{2+}$,P) and (LiF(Mg,Ti) TL materials. Emission spectrum of LiF(Mg,Cu$^{2+}$) represents a peak maximum at 450 nm with a wide shoulder ranging from 520 nm to infrared area. Emission peak of LiF(Cu$^{2+}$) is situated at 380 nm and its tail also is stretched to infrared. The temperature rates of main peak in glow curves for LiF(Mg,Cu$^{2+}$) and LiF(Cu$^{2+}$) lie at 200 °C and 250°C, respectively. Based on the obtained results, Cu impurity in LiF(Mg,Cu,P) has a major role in removing emission frequencies which are higher than 500 nm and also UV sensitivity.

Keywords: thermoluminescence, emission wavelength, trap center, LiF(Mg,Cu$^{2+}$), LiF(Cu)

For full article, refer to the Persian section