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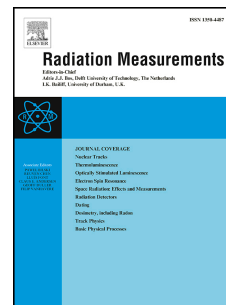
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Recent development in the optical stimulation of luminescence.

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Abstract

Both in thermoluminescence (TL) and in optically stimulated luminescence (OSL), the physical quantity that governs the luminescence process is the probability of electron release from a trap. Thanks to the usage of the temperature dependence of this quantity, the TL analysis enables estimation of the parameters that determine uniquely a trap. During TL measurements is possible to empty shallow traps without depopulating the deeper traps. This is not possible in the course of the standard OSL measurements that do not exploit the dependency of the optical cross-section (OCS) on experimental parameters. Moreover, the OCS, the only parameter that can be determined from these standard measurements, does not define the trap uniquely. It depends on at least three trap parameters and on the experimental conditions. Recently, investigations were undertaken to reduce this unfavourable for OSL unbalance between TL and OSL methods. The idea was to cause during optical stimulation the changes of the electron release probability similar to those exploited in TL measurements. The foundation of such a stimulation method is the proper expression that describes the OCS dependence on stimulation energy and temperature. Such expression was proposed previously and here it is shown how the three factors: the stimulation energy, the temperature and the shape of the stimulation band, may be used for generating the OCS changes during the optical stimulation. Results of computer modelling of adequate luminescence processes are presented together with a few simple experiments that were carried out for all kinds of stimulation.

keywords: Optically stimulated luminescence, Electron-phonon coupling, Optical cross-section,

Variable energy stimulation OSL, Thermally modulated OSL, Band shape modulated OSL

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