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iCOM

5th International Conference
on the Physics of Optical Materials
and Devices

BOOK OF
ABSTRACTS

Igalo, Montenegro
27th to 31st August 2018

The 5th International Conference on the Physics of Optical Materials and Devices

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UNIFIED CONFIGURATION-ENTHALPY MODEL DESCRIBING OPTICAL RESPONSE ORIGINATED FROM PHYSICAL AGEING AND HIGH-ENERGY IRRADIATION IN CHALCOGENIDE GLASSES

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The unified configuration-enthalpy model based on conjugated configuration-coordinate and thermodynamic-enthalpy diagrams is developed to describe the phenomenology of optical response in structural metastability of chalcogenide glasses activated under combined effects of physical ageing and high-energy irradiation [1,2] (Fig. 1).

This model foresees the glass stabilization in the ground state and short-lived excited state, the former being presented by interconnected states (i.e. metastable rejuvenation-induced, metastable irradiation-induced and most stable physically-aged ones) linked by thermally-activated over-barrier and tunneling through-barrier transitions. Effect of irradiation is reflected by vertical transitions of atomic sites into excited state followed by spontaneous relaxation into irradiation-induced sub-state.

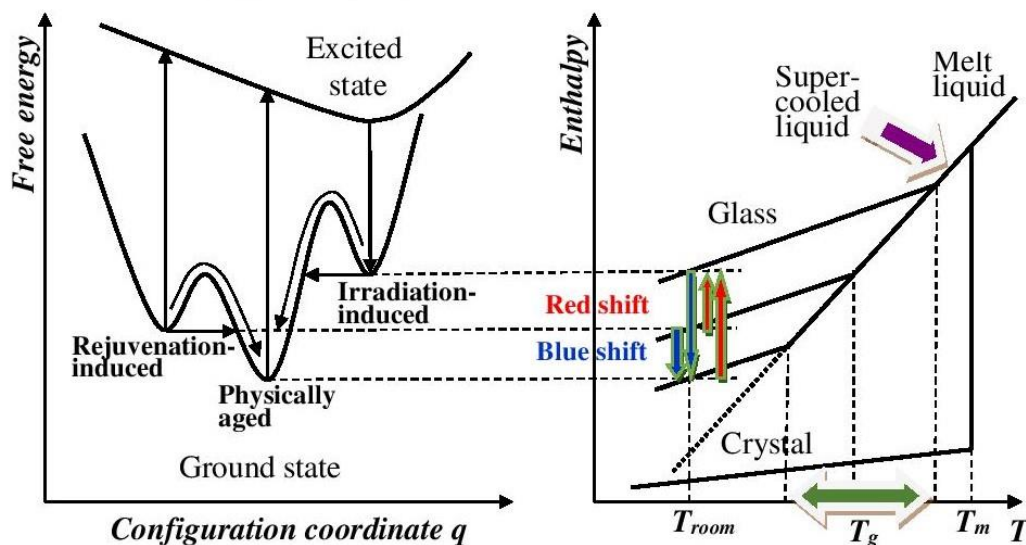


Figure 1. The conjugated configuration-coordinate and enthalpy diagrams describing structural metastability states in chalcogenide glassy semiconductors.

The thermodynamic-enthalpy diagram conjugated to this part (right-sided of Fig. 1) allows complete parameterization of corresponding optical responses related to these sub-states, which can be defined in blue or red shift in optical absorption edge of chalcogenide glasses.

References:

[1] O. Shpotyuk, R. Golovchak, A. Kozdras, in: J.-L. Adam, X. Zhang (Eds.), Chalcogenide glasses: Preparation, properties and applications, Woodhead Publ. Ser. in Electron. and Opt. Mater., Philadelphia-New Delhi, 2013., pp. 209-264.

[2] M. Shpotyuk, O. Shpotyuk, R. Golovchak, J. McCloy, B. Rile, J. Non-Cryst. Sol. 386 (2014) 95-99.