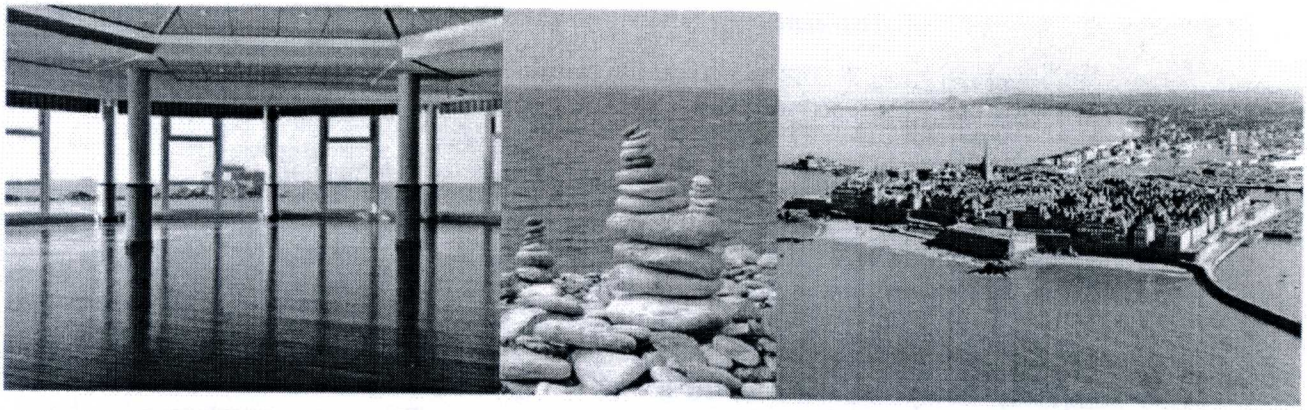

ISNOG 2012

July 1-5

Saint-Malo, France

UNIVERSITÉ DE RENNES 1

cnrs

II-P33

Stretched exponential parameterization for *in-situ* photodarkening kinetics in amorphous As-Se films

Balitska V.O. [1,2], Iovu M.S.[3], Shpotyuk O.I.[1,4]

[1]Lviv State University of Vital Activity Safety, Ukraine

[2]Lviv Scientific Research Institute of Materials of SRC "Carat", Ukraine

[3]Center of Optoelectronics, Institute of Applied Physics, Moldova

[4] Institute of Physics, Jan Dlugosz University of Czestochowa, Poland

vbalitska@yahoo.com

Photoinduced effects in thin chalcogenide films of binary As-Se cut-section are known to be revealed in their darkening (long-wave shift of fundamental optical absorption edge), clearly demonstrating two different components in dependence on film composition and illumination parameters, the transient occurring under *in-situ* photoexposure along with metastable remaining in the irradiated films after illumination stopping [1]. Strict information on the kinetics of these effects is important in view of application of chalcogenide films in information storage systems.

The kinetics of *in-situ* photodarkening in amorphous $As_{100-x}Se_x$ films was carefully examined to justify its revealing under a wide variety of experimental-measuring conditions. We choose $As_{40}Se_{60}$, $As_{50}Se_{50}$ and $As_{60}Se_{40}$ films of different thicknesses (from 0.54 to 4.07 μm) and thermal pre-history (virgin and annealed) pumping with the same absorbed light having different penetration depths. The principal conclusion of this research agreed well with [2] is that *in-situ* phodotodarkening itself is governed by a single exponential rule, but in dependence on penetration depths of pumping light this behaviour attains a stretched character. The smaller penetration depth in respect to film thickness, the more dispersive behaviour is revealed in photodarkening kinetics parameterized with stretched exponential low.

References

[1]. Ganjoo A., Jain H. Millisecond kinetics of photoinduced changes in the optical parameters of As_2S_3 films. – Phys. Rev., 2006, v. B74, p. 024201-1-6.

[2]. Shimakawa K., Nakagawa N., Itoh T. The origin of stretched exponential function in dynamic response of photodarkening in amorphous chalcogenides. – Appl. Phys. Lett., 2009, v. 95, p. 051908-1-3.