

**МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ  
СУМСЬКИЙ ДЕРЖАВНИЙ УНІВЕРСИТЕТ  
ФАКУЛЬТЕТ ІНОЗЕМНОЇ ФІЛОЛОГІЇ  
ТА СОЦІАЛЬНИХ КОМУНІКАЦІЙ**



# **СОЦІАЛЬНО-ГУМАНІТАРНІ АСПЕКТИ РОЗВИТКУ СУЧАСНОГО СУСПІЛЬСТВА**

**МАТЕРІАЛИ ВСЕУКРАЇНСЬКОЇ НАУКОВОЇ КОНФЕРЕНЦІЇ ВИКЛАДАЧІВ,  
АСПІРАНТІВ, СПІВРОБІТНИКІВ ТА СТУДЕНТІВ**

**(Суми, 21-22 квітня 2016 року)**

Суми  
Сумський державний університет  
2016

agencies, and the fact that Ministry of finance of Ukraine forms financial politics. So, considering the experience of European Union countries, today it is necessary to unite and pass all plenary powers of law enforcement agencies in the sphere of financial and economic security of the state to the single law-enforcement agency.

## **MODELING THE NON-EQUILIBRIUM EVOLUTIONARY THERMODYNAMICS OF FRAGMENTATION REGIME AT SEVERE PLASTIC DEFORMATION**

D.S. Troshchenko – *postgraduate*  
(*Sumy State University*),  
V.S. Kurochkina – *EL Advisor*  
(*Sumy State University*)

Nowadays, metals are subjected to different forms of processing for obtaining the high mechanical properties (high strength and plasticity). This objective is achieved most cardinally at grinding the grain structure of metals due to their processing by the methods of severe plastic deformation (SPD).

At present, a special theory is being developed. It is based on the Landau theory concept of phase transitions. Within the framework of this theory, it is possible to explain many important features of the SPD process. However, these methods do not take into account the influence of fluctuation noise, which can critically change the nature of system evolution. Moreover, the connection between generations of several types of defects has not been revealed yet, for example, such defects as the grain boundary and dislocation. Their interaction can provide the stationary domains formation at the phase diagram.

The density of grain boundaries, dislocations and entropy are introduced for describing the defect structures. This allows us to take into account the two channels of energy dissipation (thermal one and defect formation). The phase diagram that establishes the domains of different

limit structures has been obtained. The formation conditions for two limit structures have been found.

Self-similar regime corresponds to the selection of the parameters, at which a set of limiting structures is formed with different size of grains. There have been determined such parameters at which the distribution of energy density of grain boundaries has a power series form. The kinetics of setting the steady-state values of defects density is investigated within the scope the adiabatic approximation. It is demonstrated that grain sizes in the limit structures decrease with the increase in elastic strains.

## **SPIROPYRAN AS A NEW WORD IN MODERN DYNAMIC MATERIALS**

O.A. Kovalenko –*postgraduate*  
(*Sumy State University*),  
V.S. Kurochkina – *EL Advisor*  
(*Sumy State University*)`

Nearly all the traditional man-made materials are static in both form and function, and only quite recently the synthetic materials chemists have shifted their attention to the dynamic materials. These dynamic materials have multiple advantages over their static counterparts: selected properties of interest can be reversibly “turned on” and “off” at will and the ability to reconfigure these materials imparts upon them many uses.

One of the representatives of dynamic materials is the photochromic materials. The investigation of photochromic materials is very actual and attracts scientist’s attention because of the broad spectra of possible applications. Products that are based on these materials find application in data storing technologies and reproducing information, colour filters production, photochromic lenses production and various components of molecular electronics. They are also used in medicine for cancer diagnostic and treatment.

The prominent representative of photochromic compounds is spiropyran – molecule with single bonds that can turn into one of two states under the influence of photons with different energies. This molecule has particular configuration. This molecules are related to one of the most prospective and studied class of organic photochromic compounds.