

## В НАУКОВИХ КОЛАХ

### **The 12<sup>th</sup> POLISH-UKRAINIAN-GERMAN SUMMER SCHOOL ON FRACTURE MECHANICS AND STRENGTH OF MATERIALS**

Polish-Ukrainian-German Summer School (SS) on Fracture Mechanics and Strength of Materials was founded in 1995. It has already got the impressive history and status in the Central Europe and has made a significant contribution to the activities of the European Structural Integrity Society, ESIS (in cooperation with ESIS Technical Committee № 13 “Education and Training”) [1]. The main task of SS – to acquaint young scientists with recent achievements in the field of material science and mechanical engineering. The evaluation of the safety of engineering structures, their deformation, fracture and technical state diagnostics is of a special interest. Much attention was also paid to the development of the methods of extension of the safe in-service lifetime of structures exposed to severe service conditions. The lecturers presented within the series of SS meetings covered, among the others, the following subjects:

1. Theory of deformation and fracture of solid bodies.
2. Fatigue and durability of materials.
3. Methods of NDT and diagnostics of the long-term in-service structures.
4. Corrosion and corrosion-mechanical fracture of metals.
5. Strength of reinforced concrete structures and buildings.
6. Strength and durability of welded joints.
7. Problems of hydrogen-metal interaction and hydrogen technologies.
8. Problems of friction and wear.
9. Standards of the evaluation of structural materials workability.



During opening of the 12th SS (from the left):  
Prof. Z. Pakiela, M. Lewandowska, V. V. Panasyuk.

The 12<sup>th</sup> Polish-Ukrainian-German SS on the problem “Fracture of Materials and Micromechanisms” was held on September 18–19 in Warsaw. The hosting institution was Materials Science and Engineering Faculty of the Warsaw University of Technology. The Scientific Committee of the SS consisted of Prof. K.-J. Kurzydowski (Warsaw University of Technology), W. Kasprzak (Wrocław University of Technology, Poland), V. V. Panasyuk (Karpenko Physico-Mechanical Institute, Ukraine), G. Wilde (Münster University,

Germany), M. J. Zehetbauer (Vienna University, Austria). The SS program allowed the participants to attend also the Symposium “Mechanical Properties of Nanomaterials – Experiments and Modelling” of EMRS Fall Meeting 2011, September, 20–23, 2011.



The Ukrainian delegation at SS.

There were 39 participants of the SS including those from Poland (21), Ukraine (14), Austria (3) and Germany (1). Prof. Z. Pakiela (Poland) opened SS and Prof. M. Lewandowska (co-organizer of Symposium, Poland) and Prof. V. V. Panasyuk took the floor with welcome addresses.



The SS lecturers Dr. J. Krzak-Ros, Prof. M. J. Zehetbauer and Prof. I. M. Dmytrakh.

The next lectures were presented by: Prof. Z. Pakiela, *Fatigue and fracture on nanocrystalline metals*; Prof. H. M. Nykyforchyn (Ukraine), *In-service degradation of oil and gas trunk pipelines steels*; Dr. J. Krzak-Ros (Poland), *Selected nanomaterials obtained by the sol-gel method. Synthesis, properties and biomedical application*; Dr. O. Z. Student (Ukraine), *New methods for an evaluation of workability of structural steels, exploited at elevated temperatures in hydrogen enriched environments*; Prof. M. J. Zehetbauer, *Fatigue, fracture toughness and crack propagation of SPD processed nanomaterials*; Prof. I. M. Dmytrakh (Ukraine), *Fracture risk assessment and strength of pipeline steels for hydrogen transmission systems*; Prof. G. Wilde, *Nanostructure evolution during severe plastic deformation: do we approach the limits of plasticity*.

In the lectures on nanostructural materials, the main attention was paid to the mechanisms of deformation and hydrogen effect on the mechanical behaviour of materials – fracture mechanisms. The subject of hydrogen effect on the fracture mechanisms plasticity

of nanocrystalline structure discussed during SS is certainly one of the hot topics in the modern materials science and engineering.

The Symposium opened to the SS participants the recent achievements in deformation of nanomaterials. Much interest was paid to investigation, modelling and engineering of interfaces in nanomaterials. The symposium lectures covered also problems of stability and defect evolution in nano- and microscale volumes; temperature and time-dependent mechanical response; fracture, fatigue, and degradation of mechanisms in nanomaterials; atomistic and multiscale simulation of mechanical behaviour of nanomaterials.



Lecture by Prof. K.-J. Kurzydowski at the Symposium.



Observation at the Symposium of the SS listeners' posters: young scientist O. I. Maksymiv, Prof. V. V. Panasyuk and Prof. H. M. Nykyforchyn.

The SS participants presented at the Symposium the following posters: I. Ya. Zhbadoskyi, *Nanosize interlayer influence on concentration of dynamic stresses near a penny-shaped crack in piecewise-homogeneous space*; B. S. Slobodian, *Contact of solids with liquid bridges in intercontact nanogap*; V. S. Synyuk, *Hydrogen influence on bead cracking and stress relaxation in the bend test: experiment and simulation*; I. N. Klochkov, *Fatigue assessment of fusion welded Al alloys: scale factor and residual stresses*; R. T. Bishchak, *Mesomechanics of multiple cracking of nanostructured coatings under cyclic loading*; O. V. Maksymiv, *Effect of hydrogen on mechanical behaviour of surface nanocrystalline steel structure*; O. L. Bilyy, *Research on the strength of the inner surface of pipelines in the presence of defects of different shapes and geometry in the hydrogenating environment*; P. Ya. Lyuty, *Influence of the hydrogen treatment on nanostructure formation in Sm-Co base alloys*; T. R. Stupnytskyi, *Structure and mechanical properties of nanodispersed electric arc coatings*. O. B. Zgalat-Lozynskyy presented the oral lecture, *Influence of size effect and interfaces on mechanical properties for bulk nanomaterials consolidated by microwave, spark plasma and rate-controlled sintering*.

During the meeting it has been tentatively agreed that the next 13<sup>th</sup> SS will be held in 2013 and hosted by the Wroclaw University of Technology.

1. *Panasyuk V. and Kasprzak W. Summer schools on fracture mechanics. – Lviv: Spolom, 2007. – 296 p.*

*Z. Pakiela, H. Nykyforchyn*