

Institute of Strength Physics and Materials Science
Siberian Branch Russian Academy of Sciences

INTERNATIONAL CONFERENCE

**Physical mesomechanics of condensed matter:
Physical principles of multiscale structure formation
and the mechanisms of nonlinear behavior**

6-8 September 2022
Tomsk, Russia
<http://meso.ispms.ru/En/>

PLENARY PROGRAM

ORGANIZERS

Institute of Strength Physics and Materials Science SB RAS, Russia
Institute of Theoretical and Applied Mechanics SB RAS, Russia
Lavrentyev Institute of Hydrodynamics SB RAS, Russia
Ishlinsky Institute for Problems in Mechanics RAS, Russia
Institute for Metals Superplasticity Problems RAS, Russia
Baikov Institute of Metallurgy and Materials Science RAS, Russia
Ministry of Science and Higher Education of the Russian Federation
Siberian Branch of RAS, Russia
Tomsk Polytechnic University, Russia
Tomsk State University, Russia
Institute of Continuous Media Mechanics UrB RAS, Russia
Institute of Engineering Science UrB RAS, Russia
Institute of Physical-Technical Problems of the North SB RAS, Russia
Institute of Petroleum Chemistry SB RAS, Russia
Technische Universität Berlin, Germany
University of Stuttgart, Germany
University of Miskolc, Hungary
Jožef Stefan Institute, Slovenia
University of the Basque Country, Spain

Tomsk 2022

6 September 2022 (Tuesday)

(Tomsk time, UTC+7)

Chairmen: Kolubaev E.A., Fomin V.M., Popov V.

09:00-09:10 **Conference opening ceremony**

09:10-09:40 **Kolubaev E.A.**

(ISPMS SB RAS, Tomsk)

Fundamental aspects of mixing zone formation in friction stir processing/welding

09:40-10:10 **Fomin V.M.**

(ITAM SB RAS, Novosibirsk)

Determination of elastic characteristics of nanosized fillers through homogenization models

10:10-10:40 **¹Popov Valentin, ²Ken Nakano**

(¹Technische Universität Berlin, Germany; ²Yokohama National University, Japan)

Contact Mechanics of Clusters of Heart Cells: Mechanical Activation and Synchronization of Myocytes

10:40-11:00 **Coffee break**

11:00-11:30 **Xizhang CHEN**

(College of Mechanical and Electrical Engineering, Wenzhou University, China)

Additive manufacturing of high-entropy alloys

11:30-12:00 **Valiev R.Z.**

(USATU, Ufa; SPBU, Saint Petersburg)

Bulk nanostructured materials for application in extreme environments

12:00-12:30 **Polyanskiy V.A.**

(IPME RAS, Saint-Petersburg)

Using the models of boundary layer in solids to predict plastic deformation and fracture of metals

12:30-12:40 **Zakharov A.D., Leschev K.A.**

(Fianum Lab LLC, Moscow)

Advanced solutions of the Russian manufacturer Fianum Lab LLC for analytical and research laboratories

7 September 2022 (Wednesday)

(Tomsk time, UTC+7)

Chairmen: Kraus E.I., Chumlyakov Y.I.

09:00-09:30 **Kraus E.I.**

(ITAM SB RAS, Novosibirsk)

Numerical modelling of high-rate interaction of heterogeneous solids

09:30-10:00 **Kamantsev I.S.**

(IES UB RAS, Ekaterinburg)

Design of advanced composite materials and approaches to the analysis of composite structure, properties and durability (results of research by the Institute of Engineering Science, Ural Branch of the Russian Academy of Sciences)

10:00-10:30 **Chunguo ZHANG**

(Key Laboratory of Road Construction Technology and Equipment, MOE, Chang'an University, China)

Prediction of small-specimen fracture pertinent to material microstructure and relative sizes of notch

10:30-10:50 **Coffee break**

10:50-11:20 **Chumlyakov Y.I.**

(TSU, Tomsk)

Development and study of new high-strength poly- and single-crystals of high-entropy alloys based on TiNi and FeNiCoAlTa with high-temperature shape memory and superelasticity effects

11:20-11:50 **Chang YE**

(School of Mechanical Science and Engineering, Huazhong University of Science and Technology, China)

Improving peening efficacy through high amplitude short duration pulsed current

11:50-12:20 **Shanyavsky A.A.^{1,2}, Nikitin A.D.², Soldatenkov A.P.¹**

(¹Aviation Register of the Russian Federation, Khimki; ²IAI RAS, Moscow)

Wave process of plastic deformation of titanium alloys and its determining role in the mechanisms of failure of compressor disks at different scales

8 September 2022 (Thursday)

(Tomsk time, UTC+7)

Chairman: Nazarov A.A., Konovalov S.V.

09:00-09:30 **Nazarov A.A.**

(IMSP RAS, Ufa)

Ultrasonic welding of metals: equipment, modes, structure and mechanical properties of joints

09:30-10:00 **Jing XIE**

(Department of Engineering Mechanics, School of Mechatronical Engineering, Beijing Institute of Technology, China)

Modeling the spatio-temporal evolution of bone-implant interface stiffness via a stochastic numerical approach

10:00-10:30 **Lenskiy M.A.**

(BIT ASU, Biysk)

Organoboron polymers as universal modifiers of polymer composite materials

10:30-10:50 **Coffee break**

10:50-11:20 **Konovalov S.V.**

(SibSIU, Novokuznetsk)

Development of technology for wire-arc additive manufacturing for the manufacture of high-entropy alloys

11:20-11:50 **Berman A.F.**

(ISDCT SB RAS, Irkutsk)

Artificial intelligence technologies to substantiate the structural properties of materials

11:50-12:20 **Bashkov O.V.**

(Komsomolsk-na-Amure State University, Komsomolsk-on-Amur)

Acoustic emission during deformation and fracture of polycrystalline and composite materials

12:20-12:50 **Kaibyshev R.O.**

(BelSU, Belgorod)

Quenching and partitioning (Q&P). Steels and heat treatment