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11:00-11:25	***Title:*** *Analytical Transmission Electron Microscopy of Materials: Methods to Distinguish Interdiffusion and Segregation* ***Dr. Thomas Walther,*** Reader, Director Kroto Centre for High-Resolution Imaging & Spectroscopy, Department of Electronic & Electrical Engineering, University of Sheffield, UK
11:25-11:50	***Title:*** *High-resolution Quantitative Phase Imaging of Fields Shaped by Plasmonic Metasurfaces* ***Dr. Tomas Sikola,*** Professor, Brno University of Technology, Czech Republic
11:50-12:15	***Title:*** *Microscopy Observation of Porous Germanium with Metal Nanoparticles Formed by Ion Implantation* ***Dr. Andrey Stepanov,*** Professor, Kazan Physical-Technical Institute, Russian Academy of Sciences, Russia
12:15-12:40	***Title:*** *Evolution of 3D Structure of Nanoporous Gold upon Annealing: An In Situ ESEM and Serial Block Face-SEM Combined Approach* ***Dr. Andrea Falqui,*** Associate Professor, King Abdullah University of Science and Technology, Saudi Arabia

Stream 4: Crystallography

Session 411: Advanced in X-ray Studies and Crystallography of Materials Science

Time: 15:55-17:40, November 13, 2019 (Wednesday); Place: Salon Gontard B, Ground Floor

Chair	***Dr. Eva Majkova,*** Senior Research Fellow, Institute of Physics, Slovak Academy of Sciences, Slovakia

15:55-16:00	**Chair's Introduction**
16:00-16:20	***Keynote Speech*** ***Title:*** *Kinetics of Nanostructure Formation by In-Situ Grazing-incidence X-ray Scattering – Three Topical Examples* ***Dr. Eva Majkova,*** Senior Research Fellow, Institute of Physics, Slovak Academy of Sciences, Slovakia
16:20-16:40	***Title:*** *AMi, An Inexpensive Open Source Microscope System for Imaging the Contents of Multi-well Plates* ***Dr. Andrew Bohm,*** Associate Professor, Tufts University School of Medicine, USA
16:40-17:00	***Title:*** *A Novel Method for Direct Adhesion Measurement at Diamond/Metallic Binder Interface* ***Dr. Daria A. Sidorenko,*** Researcher, National University of Science and Technology "MISIS", Russia
17:00-17:20	***Title:*** *Practical Use of New Quality Products of Antifreeze Protein* ***Dr. Sakae Tsuda,*** Chief Senior Researcher and Professor, National Institute of Advanced Industrial Science and Technology (AIST) and Hokkaido University, Japan
17:20-17:40	***Title:*** *Application Vlasov's Model for Solids to the Analysis of Defect Formation* ***Dr. Vitalyi Igorevich Talanin,*** Professor, Khortytsia National Academy, Ukraine

Abstract Book

Time: November 13-15, 2019
Place: Regent Berlin, Germany

Title: Application Vlasov's Model for Solids to the Analysis of Defect Formation

Dr. V.I.Talanin, Dr. I.E.Talanin, O.Matsko, and D.I.Yakymchuk*
*Professor, Khortytsia National Academy, Ukraine

Abstract

The problems of applying A.A.Vlasov's (1908-1975) model for solids (1945) to describe the nucleation of defect structure with allowance the real thermal conditions of dislocation-free silicon single crystal growth are considered. It is shown that the classical theory of nucleation and growth of second-phase particles in solids and Vlasov's model for solids are identically consider the formation and evolution of second-phase particles during crystal cooling after growth. A method is proposed for calculating the initial defect structure of crystals, which includes Vlasov's model for solids and the classical theory of nucleation and growth of second-phase particles in solids.

In Vlasov's model for solids, the periodic probability density distribution of particles is the state (motion) of a system of particles, not a construct. The method of self-consistent field can be applied to a wide variety of systems. The interaction in these systems can be short-range or long-range, weak or strong.

The meaning of the last sentence can be figuratively illustrated as follows. Vlasov showed that plasma is a system "pulled together by distant forces," i.e., in fact, it is an analogue of Universe pulled together by force lines. The taking into account of these forces allows us to speak about dissemination in plasma, i.e. and in the Universe, the longitudinal waves associated with a change in electron density, and also with a large dispersion, and this dissemination is a so-called collective vibrations of a multiparticle system. One of the main conclusions of Vlasov's theory for solids is that the classical "lattice-point" model of solids is only one of the possible states of a crystal, but in reality atoms in a crystal move freely, propagating along the so-called "threads" and "plates", the direction of which coincides with the direction of the crystallographic axes and planes, which are distinguished by the maximum population of atoms. In this conclusion Vlasov confirm of force lines concept by Faraday-Thomson, along which there is a maximum density of charged particles, i.e. matter.

In a global sense, the conclusions of Thomson and Vlasov can be identified with the idea of a "large-scale structure of the Universe". According to this idea, the Universe is a collection of flat "sheets" separated by "empty" areas in which there is practically no luminous matter. These sheets, along which the main mass of matter is distributed, can be identified with the Thomson and Vlasov force lines.

Vlasov, in his constructions, was repelled by the theory of N.P. Kasterin (1869-1947). Kasterin derived second approximations of the Euler and Maxwell equations, showing their complete parallelism, taking into account Thomson's theory in the calculations.

So, Vlasov developed Kasterin theory in the sense that one should look for the following approximations when solving known equations and said that the degree of the equation depends on the amount of information about the motion of particles. It follows that adequate mathematical theories should emphasize the identity of the processes occurring at the macro and micro levels, which indicates the absence of any duality in nature.

Thus, our proof of the validity of Vlasov's theory for solids as applied to the real material, indirectly testifies to the validity of all other theoretical ideas that Vlasov was repelled from.