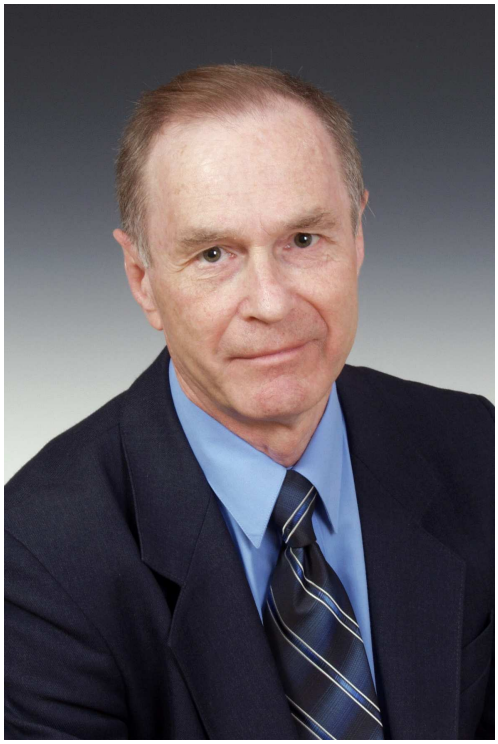
ANTON GRYGOROVYCH NAUMOVETS (to his 70th birthday)



On January 2, 2006, Anton Grygorovych Naumovets — the outstanding scientist and the recognized expert in the field of physical electronics and surface science, Academician of the National Academy of Sciences of Ukraine — was 70 years of age.

A.G. Naumovets was born in the village of Rudka (the Pinsk district of the Brest region, Belarus) in a teacher's family. After leaving the secondary school, he entered the Faculty of Radiophysics at the Taras Shevchenko Kyiv State University and eventually obtained a honor degree. The scientific activity of A.G. Naumovets started at the Institute of Physics of the Academy of Sciences of Ukraine in 1957. Here, working as an engineer and being a post-graduate student, he continued his education and began to study the surface phenomena on metals.

From the very beginning of A.G. Naumovets's scientific activity, his researches have been distinguished by applying the most informative and powerful techniques. His experiments have always been carried out under carefully controllable conditions of ultrahigh vacuum, using single crystals of metals with a definite structure and a definite chemical composition of the surface. The lack of macrosized single crystals of metals in the late 1950s and in the early 1960s forced A.G. Naumovets and his colleagues to begin the studies of the surface of microcrystalline probe tips in a field-emission projector. In the course of these researches, the reliable data, among the first ones in the world, were obtained: the influence of the adsorption on a work function for various faces of single crystals was studied, the drift of adsorbed atoms in a non-uniform electric field was investigated, and the polar character of adsorption bonds was established. A helium field-ion projector, being the first one in the former USSR, with a resolution on atomic scale was created by A.G. Naumovets.

Since the middle of the 1960s, A.G. Naumovets and his colleagues began the extended studies of the structure of submonolayer films adsorbed on the faces of macrosized metallic single crystals making use of the method of low-energy electron diffraction. For the first time, crystals were cooled in the course of such experiments to prevent the thermally induced disordering of adsorbed films. This made it possible to observe a wide set of surface structures unknown at that time. In particular, the long-period two-dimensional lattices, which were revealed experimentally, have evidently demonstrated the presence of a long-range lateral interaction in adsorbed layers. Such researches were carried out by A.G. Naumovets and his colleagues by applying the cooling of crystals by liquid nitrogen and, soon, by liquid helium, so that they had got a long start over similar investigations in other laboratories.

By a series of purposeful comparative experiments on the surfaces of crystals, which possessed similar atomic structures but different chemical nature, A.G. Naumovets and his collaborators verified the existence of interactions between the adsorbed particles through the electron gas of a substrate, which had been predicted theoretically. These results are of the fundamental importance for the development of the methods to control the surface properties. A.G. Naumovets and a group of collaborators headed by him have created a unique database concerning the phase transitions in adsorbed submonolayer quasi-two-dimensional films. In particular, phase transitions of the two-dimensional condensation type in films with the repulsive interaction of adsorbed atoms were discovered, the orientational phase transitions were revealed, and the qualitative differences between the disordering characters of commensurate and incommensurate films were found. These results confirmed the theoretical foresights of L.D. Landau and R. Peierls. The works of A.G. Naumovets and his colleagues made it possible to reveal the essential influence of phase transitions in adsorbed layers on the physical and chemical properties of a surface, in particular, on the electron work function and the kinetics and the mechanism of surface diffusion. The fact that the work function is not affected substantially by the order-disorder phase transition was explained by a crucial role that the short-range order plays in the film structure. The researches of the surface diffusion resulted in the discovery of the dynamic self-organization of the diffusion zone and in the development of the idea of a cooperative soliton mechanism of the diffusion. These results are of great value for the materials science of surfaces and for the comprehension of the substance transfer over the surface occurring in catalysis, microelectronics, and crystal growth phenomena.

A.G. Naumovets and his collaborators observed, for the first time, the phenomenon of electron-induced disordering of films at the irradiation of the surfaces with low-energy electrons. Under such conditions, defects are generated in an ordered film. This phenomenon can be observed only provided the deep cooling of a crystal to prevent the annealing of defects. These pioneer works of A.G. Naumovets and his collaborators were summarized in the first review of works concerning the radiation-induced mobility of surface particles which is single, until now, in the world literature .

Along with the studies of purely adsorptive phenomena on the metal surface, A.G. Naumovets was also engaged in studying the problems of nanophysics, nanotechnology, and nanoelectronics. First of all, we mention his investigation of the properties of metal island films, which had been the object under study at the Institute of Physics of the NAS of Ukraine for a long time, and the development of a new technology to produce them. Together with his colleagues, he prepared and studied the island films with the controllable arrangement of current channels, which allowed a conclusion to be drawn in favor of the model of nonequilibrium heating of the electron gas in metal nanoparticles. Important and interesting are results obtained by A.G. Naumovets and his collaborators while studying the field emission of electrons from germanium nanoparticles (quantum dots) grown on a silicon surface. In this case, the resonant tunneling of electrons, which is related to the presence of the quantized electron spectrum in a nanoparticle, has been discovered.

Important results were also obtained by A.G. Naumovets and his colleagues when studying the physical factors which govern the structure of thin films of some organic compounds, whose molecules have a rod-like shape and possess a certain polar group. The ordering in thin layers of such molecules adsorbed from the gas phase was found to be considerably higher on the substrates with a polar bond character such that there are strong local electric fields near their surfaces. A.G. Naumovets suggested to use such substrates for producing the well-arranged epitaxial films of some organic substances. In the extremely promising field of scanning tunnel microscopy, A.G. Naumovets proposed to use substrates with a low work function, which considerably enhanced the opportunities of this powerful method in the study of large organic molecules and other objects with low tunnel transparency.

The scientific results obtained by A.G. Naumovets and his collaborators are widely known among the scientific community of Ukraine as well as the near and far abroad. They are actively cited in the literature. He is the author and co-author of over 190 scientific publications, including 2 monographs, one of which ("Two-Dimensional Crystals") was published in Russian and English and is the first monograph in the world concerning the two-dimensional crystalline state of substances. A.G. Naumovets has also published a number of reviews on surface science in such authoritative editions as Uspekhi Fizicheskikh Nauk, Ukrains'kyi Fizychnyi Zhurnal, Fizika Nizkikh Temperatur, Soviet Science Reviews, Surface Science Reports, and others. He was an invited lecturer at a lot of authoritative international conferences, as well as a member of the program committees of such conferences.

The scientific researches of A.G. Naumovets were highly estimated at the state level. He was awarded with the State Prizes of the USSR and Ukraine, the M.M. Bogolyubov Award of the NAS of Ukraine, and the V.I. Vernadskyi Award of the "Ukraine — the 21-st century" Foundation. He was honored with the title of the Honored Worker of Science and Engineering of Ukraine. A.G. Naumovets is elected also the member of the European Academy of Sciences, Arts, and Literature. He is the Soros Professor. A high scientific authority of A.G. Naumovets caused his engagement as a member of editorial boards of some leading journals (Ukrains'kyi Fizychnyi Zhurnal, Fizika Nizkikh Temperatur, Physics of Low-Dimensional Structures, Surface Science, Progress in Surface Science).

A.G. Naumovets has significant achievements in training the scientific staff (among his disciples, there are 6 Dr.Sci. and 10 Ph.D.) and in the field of scientific management. Since 1981, he is Head of the Department of Physical Electronics at the Institute of Physics of the NAS of Ukraine. He occupied the positions of the Deputy Academician-Secretary of the Department of Physics and Astronomy of the NAS of Ukraine, the Academician-Secretary of this Department. Nowadays, and now he is the Vice-President of the NAS of Ukraine. At each position, A.G. Naumovets has demonstrated an extremely diligent and creative attitude to performing his duties. At the same time, he is characterized by benevolent relations with his subordinated employees and by a permanent care of them.

A.G. Naumovets met his anniversary, being full of forces and creative inspiration. We sincerely wish him a sound health, creative enthusiasm, happiness in the family life, and well-being for many years.

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