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New books on physics and related sciences

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Ishchenko A A, Fetisov G V, Aslanov L A ***Nanosilicon: Properties, Production, Applications, Methods of Investigation and Control*** (Moscow: Fizmatlit, 2012) 648 pp. ISBN 978-5-9221-1369-4.

The monograph presents a systematic exposition of the properties, methods of synthesis, and possibilities of application of porous silicon, nanosilicon, and composite materials based on them. Detailed description and comparative analyses of the methods of fabrication of nanocrystalline silicon are given. Also described are electronic and optical properties and modern methods of investigation, which make it possible to characterize the spectral and structural properties of this material possessing unique optical (absorption of radiation in the UV region and photoluminescence in the visible region of spectrum) and electrophysical properties. Considerable attention is given to different areas of practical application: UV-protective coatings, bioanalytics, and solar power engineering. The book presents the results of the study into transformations of the properties of silicon nanoparticles as functions of the chemical composition of impurities showing their worth in synthesis and staying of nanoparticles aloft. Methods are described of diagnostics of the structure and composition of impurities, as well as methods of controlled modification of the surface of silicon nanoparticles and their size distribution functions. The monograph is recommended to a wide range of readers interested in problems of creating, studying, and using nanomaterials. The book is intended for researchers, postgraduates, and undergraduate students who major in this exciting and rapidly developing field of modern science. (Izdatel'stvo 'Fizmatlit': 117997 Moscow, ul. Profsoyuznaya 90; tel.: +7 (495) 334-74-21; fax: +7 (495) 334-76-20; e-mail: fizmat@maik.ru; URL: http://www.fml.ru/)

Saranin V A ***The Method of Electrical Images in Problem Solving and in Experiments*** (Moscow–Izhevsk: RChD Publ., 2011) 112 pp. ISBN 978-5-93972-917-8.

The book examines problems of different levels of complexity, whose solution is based in some way on the electrical image method. Particular attention is paid to problems of interaction between a charged sphere and a conducting plane and between two charged conducting spheres. Most of the problems are original and treated for the first time at a sufficiently rigorous mathematical level. Some of the problems are directly related to natural processes (e.g., the nature of ball lightning) or technological processes (such as using charged droplets in various devices). The author presents the results of original experiments examining electrostatic interactions in systems involving electrical images. Some of the results have never been published before. The book is intended for a wide circle of physicists (from undergraduate students to teachers and specialists). (Scientific Publications Center 'Regular and Chaotic Dynamics': 426034 Izhevsk, ul. Universitetskaya 1, Udmurtia State University, RKhD; tel. +7 (3412) 50-02-95; e-mail: subscribe@rcd.ru; URL: http://shop.rcd.ru/)

Fedorov V M ***The Dynamics of Glacier Mass Balance in Connection with Macrocirculation Processes in the Atmosphere*** (Moscow: Fizmatlit, 2012) 376 pp. ISBN 978-5-9221-1356-4.

Circulation processes in the terrestrial atmosphere are responsible for substantial changes in the annual, seasonal, and diurnal variations of air temperature. The formation and distribution of rainfall are connected with circulation processes in the atmosphere. Consequently, circulation processes affect the evolution of the main elements of climate that determine the conditions of formation of glaciers, and thus appear to constitute one of the most important factors, both for the spatial distribution of glaciers and for their evolution in time. The dynamics of balance indicators of glaciers is shown to be related in a special way to the duration of action of elementary circulation mechanisms (in terms of B L Dzerdzeevskii's classification); this relationship is used for the reconstruction of the dynamics of the mass balance for 25 basal and representative glaciers in the Northern Hemisphere in the 20th century. The results reveal metachronal behavior of the balance dynamics of 9 glacier regions in the Northern hemisphere during the 20th century against the general background of degradation of glaciers. Correlation analysis of the relation between the dynamics of the glacier mass balance and macrocirculation characteristics of climate revealed that the duration of action of circulation groups is the cause of metachronicity in the dynamics of ice mass balance in glacier areas, and that it determines its spacetime structure. The book is intended for experts in glaciology, climatology, paleogeography, and ecology, as well as for under- and postgraduate students and teachers in departments of geography and hydrometeorology at the university level. (Izdatel'stvo 'Fizmatlit': 117997 Moscow, ul. Profsoyuznaya 90; tel.: +7 (495) 334-74-21; fax: +7 (495) 334-76-20; e-mail: fizmat@maik.ru; URL: http://www. fml.ru/)

Biotropic Impact of Space Weather Based on the Data of the Russian–Ukrainian Heliomed Monitoring 2003–2010 (Ed. M V Ragul'skaya) (Moscow–Kiev–St. Petersburg: VVM Publ., 2010) 312 pp. ISBN 978-5-9651-0548-9.

The book describes the techniques and results of the pioneering long-term heliophysical monitoring of physiological parameters of the human body and of the environment. The work utilized a unified telecommunications network of research centers distributed among various towns and employing identical equipment and the same research

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protocol; the data were recorded online on a unified portal server. The telecommunications heliobiological project Heliomed was implemented in Russia and Ukraine in 2003–2011 (Moscow, Kiev, Yakutsk, Simferopol, Irkutsk, Saratov) by an interdisciplinary team of physicists, biologists, experts in information systems, physicians, and psychologists. Each research group wrote a chapter for the book, presenting its own interpretation of the current status, results, and problems of studying the effects of the characteristics of terrestrial and cosmic weather on the human body and adaptation processes. The study was conducted at three levels of the organization of the biosphere: the level of cellular structures, the level of the human body, and the level of ethnicity. The analysis identified several fixed programs of adaptation of the studied biosystems to cosmic and geophysical factors. The new theoretical model is proposed to treat various aspects of the nonlinear dynamics and stability of self-oscillating biosystems with respect to periodic external force and parametric noise. The book also discusses the issues of creating new integrated biotropic indices of cosmic and terrestrial weather. The work was supported by Russian–Ukrainian RFBR grant No. 09-02-90471-Ukr_f_a and Ukraine's SFBR grant F28/02-030. (Izdatel'stvo VVM: 190000 St. Petersburg, ul. Dekabristov 6, lit. A, pom. 10-n)

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