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New books on physics and related sciences

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Metastable States and Phase Transitions. Issue 3 (Collected scientific papers) (Ed. by É N Dubrovina) (Ekaterinburg: RAS UrB Institute of Thermal Physics Publ., 1999) 228 pp. ISBN 5-7691-0982-3.

This collection is concerned with the physics of the explosive boiling of pure liquids and solutions and also with phase equilibrium in solutions. It addresses boiling for decomposition reactions, offers a theory of phase transitions driven by chemical reactions, and presents research on flicker noise in critical boiling regimes. Other topics explored include the effect of water addition on the temperature of alcohol limit superheating at negative pressures; explosive boiling of potassium hydroxide in water; heat flow density in boiling emulsions with different dispersion properties; experimental data on the boiling of liquid nitrogen and solutions of helium in nitrogen at small superheatings. A new approach to processing and approximating measurement data, the so-called information set method, is illustrated with specific examples and compared with the least-squares method. Spontaneous interphase convection and diffusion regimes in liquid solutions are discussed, and a theory of first-order phase transitions and critical phenomena in liquid – vapor systems is developed. For researchers in the fields of thermal physics, molecular physics, physical chemistry, heat engineering, and power engineering. (RAS UrB Press regular mail address: 620219 Ekaterinburg, GSP-169, ul. S Kovalevskoĭ 18)

Molotkov I A, Vakulenko S A, Bisyarin M A ***Nonlinear Localized Wave Processes*** (Moscow: Yanus-K, 1999) 176 pp. Bibliography: 154 refs. RFBR project 99-02-30056. ISBN 5-8037-0039-8.

This monograph examines an important area of modern nonlinear physics — local nonlinear wave phenomena — taking asymptotic methods as a basis for analyzing and explicitly describing such phenomena. Of the wide variety of physical problems covered, those studied in greatest detail are the propagation of intense wave beams in inhomogeneous media; ultrashort pulses in nonlinear gradient light guides; waves in internally structured media, and long surface gravitational waves above a variable-depth liquid. For theoretical physicists concerned with nonlinear phenomena in radio physics, optics, plasma theory, geophysics, and acoustics as well as for specialists in mathematical physics. (Yanus-K Publ. regular mail address: Moscow, Kooperativnaya ul. 3 kor. 6 office 128; Tel. (7-095) 252-1431)

Uspekhi Fizicheskikh Nauk **170** (10) 1144 (2000)
Translated by E G Strel'chenko

Structure and Properties of Nanocrystalline Materials (Collected scientific papers) (Eds-in-Chief G G Taluts, N I Noskova) (Ekaterinburg: UrO RAN Publ., 1999) 402 pp. ISBN 5-7691-0954-8.

The present collection features hot-topic and state-of-the-art review papers as well as reports presented at the 8th International Seminar on Structure of Dislocations and Mechanical Properties of Metals and Alloys, held in Ekaterinburg on March 15 – 19, 1999. The themes of this meeting were the study of the defects, structure, and properties of nanocrystalline materials fabricated by metal glass crystallization or from states with an extremely distorted lattice. The program of the seminar included section meetings — designed as a showcase for young scientists and students — on the "Physical and technological properties of nanoncrystals and nanoceramics as materials of the future". Topics discussed covered techniques for fabricating nanocrystalline alloys and certifying a nanocrystalline state; the electronic and atomic structure of nanocrystalline materials; the structure (nanophases) and boundaries of nanocrystals; magnetic, strength, plastic, electric, tribological, and other properties of nanocrystalline materials and their physical interpretation; the theory of defects; the modelling and mechanisms of deformation and transport processes in nanocrystalline materials. The collection provides an overview of recent progress in understanding the physics and the material properties of nanocrystalline materials. For researchers and students in the field of solid-state physics and materials science. (RAS Ural Branch regular mail address: 620219 Ekaterinburg, ul. Pervomaĭskaya 91)

Interaction of Ions with Surface 1999 Proceedings 14th International Conference Volumes 1 (384 pp.) and 2 (360 pp.) (Moscow: MAI Publ., 1999)

Proceedings of the XIV International Conference on Interaction of Ions with a Surface, held in Zvenigorod, Moscow region, Russia from August 30 to September 3, 1999, presenting original theoretical and experimental research on the subject. The conference material is organized into the following sections: surface sputtering and the effect of ion bombardment on surface properties; scattering of ions and their passage through a solid; secondary-ion emission; electron, photon, and X-ray emissions from an ion-bombarded solid; physical principles of ion implantation and surface property modification, and the interaction of plasma with a solid surface. (MAI Publ. Press regular mail address: 125871 Moscow, Volokolamskoe shosse 4)

The World's First Nuclear Power Station: How It Started Collected papers (Ed.-in-Chief L A Kochetkov, chief compiler N I Ermolaev) (Obninsk: GNTs RF FÉI Publ., 1999) 140 pp.

This collection commemorates the 45th anniversary of the launch of the world's pioneer atomic power station. It uses for the first time some materials from the organizations then in charge of the project as well as from Laboratory 'V' and related project developers. These materials illustrate L A Kochetkov's earlier article written on the APS's 40th anniversary for a special issue of the journal *Izvestiya Vuzov. Yadernaya Énergetika* **4** 11 (1994) (Academician A I Leĭpunskiĭ GNTs RF FÉI regular mail address: 249020, Obninsk, Kaluga region, pl. Bondarenko 1; Internet address: http://www.ippe.rssi.ru/department/Ins)

Compiled by *E V Zakharova*