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The Third, Molecular, Form of Carbon-Fullerenes, Fullerites And Fullerides, Pre-History, Discovery and Physical Properties

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ABSTRACTS of the
XXIV INTERNATIONAL CONFERENCE

INTERACTION OF INTENSE ENERGY FLUXES WITH MATTER

ELBRUS—2009

In this book abstracts of the XXIV International Conference "Interaction of Intense Energy Fluxes with Matter" (Elbrus, March 1–6, 2009.). The reports are devoted to the modern investigations in the field of extreme states of matter, including reviews of results obtained during the last 30 years since the 1st All-Union meeting on the problem of equation of state (Cheget, October 1978).

The following questions are covered:
models and theoretical calculations of equations of state at high concentrations of energy;
physics of shock and detonation waves;
experimental methods of diagnostics of rapid processes;
interaction of strong ion and electron beams, intense laser, x-ray and microwave radiation with matter;
methods of generation of intense impulse energy fluxes; electrical explosion of conductors under the action of powerful current pulses;
low-temperature plasma physics;
different physical and energetic aspects and technologies.

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distributed electronic gas of valent electrons conductance. Gombash [1] model is used for the calculation of thermodynamic potentials of metalized phase and it describes alkali metals properties. Ionic crystal dielectric phase model is expounded in work [2]. It leads to metallization of dielectric. Minimizing thermodynamic potentials of both phases determined by metallization pressure for a number of alkali-halide crystals. Metallization pressure is calculated for massive alkali halide crystals with 0 K temperature.

1. Gombash P. Statistical Theory of Atom and Its Application. M: 1951. P. 270.
2. Karpenko S.V., Mamchuev M.O. // Basic Researches. 2006. V. 4. P. 11–14.

THE THIRD, MOLECULAR, FORM OF CARBON—FULLERENES, FULLERITES AND FULLERIDES. PRE-HISTORY, DISCOVERY AND PHYSICAL PROPERTIES

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A brief review is being done on the pre-history [1–3] and discovery [4] of fullerenes that make the third, molecular form of carbon. Higher and smaller fullerenes. A family of fulerenes. The elaboration of methods for the production, separation and deep purification of fullerenes in quantities enough for growing crystals of macroscopic sizes [5]. Fullerites and fullerides. Superconductivity of fullerides. Intermolecular forces in fullerites. The Girifalco potential is presented for eight orientationally disordered phases of fullerites from C_{28} to C_{96} and its generalization is made for the interactions between the different fullerene molecules, Cm and Cn. The thermodynamic properties of the high-temperature modifications of a family of the fullerites, from C_{36} up to the C_{96}, calculated [6] in equilibrium with their saturated vapors on the basis of the correlative method of theunsymmetrized self-consistent field that enables one to take into account the strong anharmonicityof the lattice vibrations, are discussed. The calculations were accomplished up to the temperature of loss of stability (spinodal point) T_s. The behavior of some characteristics is considered in their dependence on the number of atoms in the molecule.

1. Osawa, Kagaku 25, 854 (1970) (in Japanese).

2. Z.Yoshida and E.Osawa, Aromaticity Kagakudojin, Kyoto, 1971 (in Japanese). P. 174–178.
3. D.A.Bochvar and E.G.Gal'pern, Dokl. Akad. Nauk SSSR 209, 610 (1973) (in Russian).
4. H.W.Kroto, J.R.Heath, S.C.O'Brien, et al., Nature, 318, 162 (1985).
5. W.Kratschmer, L.D.Lamb, K.Fostinoupolos and R. D.Huffman, Nature 347, 354 (1990).
6. V.I.Zubov, Internet Electronic Journal Nanociencia et Moletronica 4, 249 (2004).

INVESTIGATION OF THE LIQUID CARBON: NEW APPROACH AND FUNDAMENTAL RESULTS

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The main results of the experimental studies of liquid carbon during the past five years are reviewed in this work. We consider methods for determining the melting temperature of graphite, carbon vapor pressure, pressure p_{tp} in the triple point of liquid carbon, contact angle (liquid carbon (LC)–graphite) and anisotropy of the graphite various edges wetting by liquid, numerical values of the variables are presented here too.

Crystallization (at speeds 10^6 K/s) of metastable non-graphite tetragonal and linear-chain forms from LC conserved under normal conditions has been considered. Registration of the laser induced periodical surface structures (LIPSS) was the evidence of graphite melting.

In this work we discuss the features of plasto-elastic deformation of graphite at high temperatures. Screw dislocations generate non-finished growth steps that result in the growth of graphite from the vapor. Step morphology analysis gave an opportunity to find difference between the mechanisms vapor-solid and vapor-liquid-solid.

We also considered growth capability of new carbon structures, such as carbon nanotubes, carbon ribs, graphene-like structures, and atomic-smooth surfaces of graphite from high pressure ($p > p_{tp}$) vapor. Produced structures are compared with the forms known to be the result of natural metamorphism and alternative synthesis methods. Feasible fields of application of the received results and structures are under consideration