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V.V.Krivetskiy, M.N.Rumyantseva, A.M.Gaskov
Department of Chemistry, M.V.Lomonosov Moscow State University, Russian Federation
Chemical methods for enhancement of the selectivity of semiconductor metal oxide gas sensors are considered taking SnO₂ as an example. Theoretical concepts concerning correlations between the metal oxide chemical composition, crystal structure, surface morphology and the oxide surface reactivity are discussed. Application of such concepts to the design of novel, highly selective sensor materials based on nanocrystalline SnO₂ is discussed in detail. Experimental data on the determination of the chemical composition, structure, activity in gas–solid chemical interaction and the sensor properties of such materials are analyzed. The applicability of modern concepts of the chemical activity of the surface in gas–solid reactions to the design of novel metal oxide sensor materials with enhanced selectivity is substantiated. Bibliography — 133 references.
- Design of photocontrolled biomolecules based on azobenzene derivatives** 942
T.S.Zatsepin, L.A.Abrosimova, M.V.Monakhova, Le Thi Hien, A.Pingoud, E.A.Kubareva, T.S.Oretskaya
Department of Chemistry, Department of Bioengineering and Bioinformatics, A.N.Belozersky Institute of Physico-Chemical Biology, M.V.Lomonosov Moscow State University, Russian Federation
Department of Engineering Physics and Nanotechnology, University of Engineering and Technology Vietnam National University, Hanoi, Vietnam
Institute for Biochemistry, Justus-Liebig University, Giessen, Germany
This review focuses on methods of designing photocontrolled proteins and nucleic acids. Data on preparation and modification of proteins and nucleic acids with azobenzene derivatives are summarized. Examples of using photoswitchable proteins, their substrates, inhibitors and ligands containing azobenzene, as well as azobenzene derivatives of nucleic acids, for design of nanomachines are considered. Bibliography — 122 references.
- β-Diketones and their derivatives in sol–gel processes** 964
N.V.Zolotareva, V.V.Semenov
G.A.Razuvaev Institute of Organometallic Chemistry, Russian Academy of Sciences, Russian Federation
Published data on the use of β-diketones, metal β-diketonates and some structurally related compounds in sol–gel syntheses of new organic–inorganic hybrid materials are analyzed. Methods of functionalization of β-diketones by carbofunctional organosilicon compounds are considered. Ways of insertion of a metal cations into hybrid organic–inorganic matrix by using of non-functionalized β-diketonates are demonstrated. Particular attention is paid to derivatives of luminescent rare-earth elements, which is due to prospects for practical application of materials obtained from these derivatives in photonics, integrated optics and medical diagnostics. The types and properties of most popular sol–gel monomers and oligomers, the luminescence properties of rare-earth metal β-diketonates and metal-free siliceous matrices are examined. Bibliography — 220 references.
- Strain-induced softening of glassy and crystalline polymers** 988
A.L.Volynskii, A.Yu.Yarysheva, E.G.Rukhlya, A.V.Efimov, L.M.Yarysheva, N.F.Bakeev
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The data on strain-induced softening of glassy and crystalline polymers accompanying by development of capability of the deformed samples to high reversible strains are analysed. It is shown that in the first deformation cycle, the test sample demonstrates properties typical of glassy or crystalline state, whereas at the repeated stretching, it undergoes transformation into a rubber-like high-elasticity state, in which the polymer is capable of high reversible strains. It is noted that this transition represents a physical basis of strain-induced softening of glassy and crystalline polymers. Bibliography — 114 references.