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O.V.Ardashov, K.P.Volcho, N.F.Salakhutdinov

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Methods of synthesis of mono-, di- and trihydroxy derivatives of limonene are presented. The attention is focused on the problems of regio- and stereoselectivity of transformations. Data on the isolation of these compounds from natural sources and on their biological activities are considered. Bibliography — 107 references.

Interaction of magnetic nanoparticles with DNA molecules: design and application of nanobiohybrid structures

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The mechanisms of interaction of nucleic acid molecules with magnetic nanoparticles and methods of their conjugation for the design of functional nanostructures are considered. The properties of nucleic acids and magnetic nanoparticles that play the key role for the design of nanobiohybrid structures are described. The scope of application of these structures in nanoelectronics and medicine is analyzed. The possible paths of adverse influence of magnetic nanoparticles on the genetic system are briefly discussed. Bibliography—287 references.

Bacterial transformations of terpenoids

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Published data of the last decade on bacterial transformations of terpenoids are analyzed. The possible routes of chemo-, regio- and stereoselective modifications of terpenoids are considered. Particular attention is devoted to new technological approaches to the synthesis of terpenoid derivatives suitable for the use in fragrance industry and food industry and promising as medicinal agents and chiral intermediates for fine organic synthesis. Bibliography — 246 references.

Mechanism of precipitate formation during spontaneous crystallization of salts from supersaturated aqueous solutions

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The models of formation of salt precipitates during crystallization from supersaturated aqueous solutions are analyzed. The results of theoretical simulation and experimental studies are compared. The attention is focused on the crystal aggregation and agglomeration processes. Data on the mechanism of crystal intergrowth during bulk crystallization of salts from solutions are considered. It is shown that intergrowth is described most reliably by the model based on Polak's theory according to which in supersaturated solutions, nuclei are formed as bridges connecting the nearest faces of the neighbouring crystals in aggregates. Bibliography — 159 references.

Thermal stability of consolidated metallic nanomaterials

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Theoretical estimates made using kinetic and thermodynamic approaches for the thermal stability of consolidated nanomaterials based on various metals, alloys and refractory compounds are considered. The main experimental data in this field including the behaviour of nanomaterials upon irradiation, abnormal grain growth and oxidation are analyzed. Bibliography — 82 references.