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**А.Г.Касцова,
А.О.Краснова,
Н.В.Глебова,
А.О.Пелагейкина,
А.А.Нечитайлов**

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Долгосрочность мембранно-электродных
блоков топливных элементов с протонообмен-
ной системой: проблемы и решения

**А.В.Яголович,
М.Э.Гаспарян,
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RCR5154

Стратегии молекулярного дизайна агонистов
рецепторов смерти цитокина TRAIL и оценка
их клинических перспектив

**В.Л.Столярова,
И.И.Васильева,
В.А.Ворожцов,
Т.В.Соколова**

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Перспективы создания материалов
на основе высокоэнтропийных оксидов,
карбидов и оксикарбидов, стабильных
при высоких температурах

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Long-term durability of membrane electrode assemblies of fuel cells with a proton exchange system: challenges and solutions

RCR5135

A.G.Kastsova, A.O.Krasnova, N.V.Glebova, A.O.Pelageikina, A.A.Nechitailov

Ioffe Institute of the Russian Academy of Sciences, 194021 St. Petersburg, Russia

The review addresses the problem of durability of operation of low-temperature proton exchange membrane fuel cells. Fuel cells are of considerable interest for the transition to renewable energy sources; however, the durability of the devices is still not sufficiently long (10 to 40 thousand hours). The increase in the durability is a relevant task. The review presents a systematic account and evaluation of the methods used for stabilization of electrochemical energy conversion systems with a proton exchange membrane and defines promising approaches to increase their service life. Bibliography — 197 references.

Design strategies and clinical prospects of cytokine TRAIL death receptor agonists

RCR5154

A.V.Yagolovich,^a M.E.Gasparian,^b A.A.Isakova,^{a,b} A.A.Artykov,^b D.A.Dolgikh,^{a,b}
M.P.Kirpichnikov^{a,b}

^a *Faculty of Biology, Lomonosov Moscow State University, 119234 Moscow, Russia*

^b *Shemyakin–Ovchinnikov Institute of Bioorganic Chemistry of the Russian Academy of Sciences, 117997 Moscow, Russia*

The development of therapeutic bispecific antibodies and hybrid proteins is one of the most urgent biomedical technologies with obvious clinical prospects. At the same time, advanced strategies of molecular design of drugs with new properties are coming to the forefront. The tumour necrosis factor-related apoptosis inducing ligand (TRAIL) receptor pathways are important components of the immune system involved in the immune surveillance and selective elimination of transformed cells. TRAIL-based proteins are therefore promising drug candidates for the treatment of malignant tumours and autoimmune diseases. In the first series of clinical trials, drugs targeting the death receptors DR4 or DR5, did not show significant anti-cancer activity. This is due to the TRAIL resistance mechanisms that tumours evolve to evade the efficient induction of apoptotic signalling. However, a wide range of novel TRAIL death receptor-targeted formulations are currently being developed, mainly to improve stability, enhance death receptor clustering and involve additional tumour targets. Over the past decade, several dozens of multi-targeted fusion proteins with either TRAIL protein or DR5-specific agonistic monoclonal antibodies have been developed to improve therapeutic efficacy. These include fusions with either short peptide tags or large functional proteins, as well as antibody fragments targeting molecular pathways involved in angiogenesis or proliferative signalling such as epidermal growth factor receptor (EGFR), vascular endothelial growth factor receptor (VEGFR), programmed death-ligand 1 (PD-L1), *etc.* Collectively, these multimodal proteins enhance the activation of extrinsic and intrinsic apoptotic pathways in transformed cells, as well as affect the tumour microenvironment. This comprehensive review systematizes the bispecific and multivalent fusion proteins and conjugates targeting TRAIL death receptors, analyze the molecular mechanisms by which they overcome tumour resistance to TRAIL, and assess their clinical prospects. Bibliography — 236 references.

Prospects for the development of materials based on high-entropy oxides, carbides, and oxycarbides stable at high temperatures

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V.L.Stolyarova,^{a,b} I.I.Vasileva,^b V.A.Vorozhtcov,^b T.V.Sokolova^b

^a Saint Petersburg State University, 199034 St. Petersburg, Russia

^b Branch of Petersburg Nuclear Physics Institute named after B.P.Konstantinov of National Research Center 'Kurchatov Institute' — I.V.Grebenshchikov Institute of Silicate Chemistry, 199034 St. Petersburg, Russia

The importance of high-entropy materials is dictated by the requirements of high-temperature technologies related to the problems of aviation and aerospace engineering, nuclear power engineering, metallurgy, and microelectronics. The significant interest in the materials mentioned is explained by a combination of unique physical and chemical properties such as high mechanical strength and hardness and chemical and thermal stability. This review gives analysis of studies that address the physicochemical properties of high-entropy oxides, carbides, and oxycarbides at high temperatures and illustrates the potential use of these results for the synthesis and operation of a broad range of materials under high-temperature treatment. It is shown that the search for optimal solutions for the development of refractory materials based on multicomponent oxides, carbides, and oxycarbides requires the use of integrated physicochemical approach, involving information on the thermodynamic properties, phase equilibria, and vaporization processes. Bibliography — 247 references.

