

У статті викладено й проаналізовано результати експерименту зі з'ясування символічних властивостей російських сонорних приголосних фонем за аксіологічною шкалою серед китайських студентів, що вивчають російську мову.

Ключові слова: *звукосимволізм, фоносемантика, сонорні приголосні фонем, російська мова.*

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RUSSIAN SONANTS FROM THE POINT OF VIEW OF CHINESE STUDENTS

Some symbolic properties of Russian sonants on the axiological scale from the point of view of the Chinese, based on experimental data, are analyzed. It was revealed that students of elementary and advanced levels of language skills perceive some phonetic material more positively than students of intermediate level do.

Keywords: *phonetic symbolism, sonants, the Russian language.*

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**TRANSLATION IN THE FIELD OF NANOSCIENCE:
TERMINOGRAPHICAL ASPECT**

The article deals with the peculiarities of nanoscience terms translation from English into Ukrainian. The definitions of "nanoscience term" and "nanoscience terminology" are given. The terminographical aspects of harmonization between nanoscience terminology development and dynamics of modern nanoscience as the corresponding field are studied.

Key words: *nanoscience, nanoscience term, nanoscience terminology, terms translation.*

The Ukrainian linguists and experts in their respective fields focus on **the present-day topical issues of modern philology**, especially on normalization and standardization of terminological systems of various subject areas and on terms translation which can be explained by the growing informatization in science and technology.

The growing interest in nanoscience, the harmonization between terminological system development and dynamics of the corresponding field, the need for linguistic and lexicographical analysis of the

nanoscience terminological system put special emphasis on the importance of this research.

The aim of the publication is to discuss the terminographical aspects of nanoscience translation. The current research is done within the framework of technical scientific lexicography (terminography). Nanoscience terms, their definitions, as well as texts focused on this broad and complex field serve as **the material for research**.

The Russian scholar D. S. Loter and the Austrian researcher Eugen Wuster, the founders of terminology as a science, as well as their followers E. K. Drezén, Ya. K. Klimovitsky, O. M. Terpigorev, S. A. Chaplygin dedicated their works to the basic notions of terminology: they focused on terms and their functioning, terminological systems and the peculiarities of their nature. Modern Ukrainian terminology and terminography have deep-rooted traditions (I. G. Verkhratsky, V. M. Rusanivsky, A. V. Kryzhanivska, T. I. Panko, L. O. Symonenko, V. L. Ivashchenko, L. I. Petrukh, I. M. Kochan, L. M. Polyuga, Ye. F. Skorokhodko, N. A. Tsymbal and others) which is proved by the number of compiled and published lexicographical works.

The Ukrainian linguists I. V. Korunets, V. I. Karaban, T. R. Kyiak, A. S. Dyakov, Z. B. Kudelko have contributed to the development of translation science in Ukraine. Different scholars perceive translation competence differently. Even the term itself has several varieties, respective authors call it *translation competence*, *translational competence*, *translation knowledge* or *translation skill* [12].

Most scholars argue that professional translation nowadays requires not only proficiency in both the source and the target languages (linguistic competence), but also comprises cultural, communicative, textual, domain/subject, research, writing, reference tools, transfer, and other competences. However, subject area knowledge and dictionary skills seem to play the most significant roles in human translation production at the quality assurance stage, especially when translators deal with science and technology texts which abound with a wide variety of terminological units. Efficient dictionary use involves knowing when to consult dictionaries, which one to consult at a given stage and how to integrate dictionary information with textual information [11, p. 58].

In order to get subject knowledge it is essential to use a wide variety of sources on nanoscience and nanotechnology published both in the Ukrainian language (e.g., books, manuals, journal articles, conference proceedings, etc.) and in English (e.g., reference guides, glossaries, in particular Encyclopedia of

Nanoscience and Nanotechnology, Glossary of Biotechnology and Nanobiotechnology Terms, Nanomedicine Glossary, etc.

Nanoscience is a new field that focuses on physical, physicochemical, biological, pharmacological, pharmaceutical, toxicological properties of the nanosized particles (up to 100 nm), the possibility of their synthesis by means of nanotechnology and their application into the various sectors of the national economy, in biology, medicine, agricultural sector [9, p. 14]. Nanoscience is considered to be one of the significant aspects of the civilization development since it embraces a wide range of issues related to technology, energy, biology, health protection, environment [7, p. 18].

It is important to emphasize that many world-famous scientists from different countries have made an important contribution to the development of theoretical and practical aspects of nanoscience and nanotechnology, e.g.: E. Schrödinger (Austria); D. M. Garkunov, I. V. Kragelskiy, Yu. S. Tikhodeev, D. A. Bochvar, O. G. Galpern, Zh. I. Alferov, K. A. Valiev, Yu. V. Gulyaev (Russia); G. A. Gamov, R. Feynman, K. E. Drexler, R. E. Smalley, (USA); Gerd Karl Binnig, Heinrich Rohrer (Switzerland); Harold W. Kroto (Great Britain); A. Fert (France); N. Taniguchi, S. Iijima (Japan); E. A. Ruska, Max Knoll, W. Barthlott, P. A. Grünberg (Germany); B. E. Paton, B. O. Movchan, V. F. Moskalenko, I. S. Chekman, Z. R. Ulberg, A. G. Naumovets, O. M. Ivasyshyn, V. F. Machulin, V. G. Baryakhtar, S. V. Volkov (Ukraine).

At the end of the 20th century – in the beginning of the 21st century in many countries of the world, including Ukraine, nanoscience and nanotechnology centres are established; government programs on nanoscience and nanotechnology are launched. In 2008 in Kyiv on the initiative of academician B. E. Paton (The E. O. Paton Electric Welding Institute) and academician V. F. Moskalenko (The O. O. Bogomolets National Medical University) a joint laboratory “Electron-beam nanotechnology of inorganic materials for medicine” was set up.

It is true that the growing interest in fundamental research in the field of nanoscience and adoption of nanotechnology in practice are of primary importance for the development of science in general. The examination of the properties of natural and synthetic nanosized materials is the very issue of the day since they are more and more frequently used in various industries and in medicine. The use of the new research methods and the application of high-resolution equipment promote extensive and thorough study of the nanoworld [5, p. 326]. Nowadays English is playing the leading role in communication in the

field of nanoscience; the Ukrainian language is also used, but there is a need for translation from English into Ukrainian. Translation requires knowing the interlanguage equivalents and serves as a tool of knowledge dissemination on nanoscience among specialists of the related disciplines and all those interested in the field.

Certainly, the central problem of modern terminology is the regulation of terminological systems of various subject areas with constant attention to the clear-cut definitions of the notions and to the relations between the notions which should be reflected in the introduced terms [2, p. 6].

Lately a possibility of becoming familiar with various lexicographical papers has appeared in Ukraine. Some of the research works deal with the peculiarities of various terminological systems, among them the following should be mentioned: automobile industry (N. V. Nikulina), library and information subject areas (N. V. Strishenets), biological studies (L. O. Symonenko), military service (Ya. P. Yaremko), geology (M. P. Hodovana), economics (T. I. Panko), environmental engineering (T. Balaban), engineering graphics (Ye. A. Antonovich, Ya. V. Vasylyshyn, V. A. Shpelchek), medicine (M. V. Dmytruk, I. V. Korneyko, N. V. Misnyk, O. B. Petrova, T. G. Sokolovska, R. I. Stetsyuk), law (O. A. Serbenska).

In the present-day terminology the notion of “term” has achieved widespread use and has gained popularity as the object of research. There have been numerous attempts to give it the accurate formulation, however none of the suggested definitions can be viewed as extensive and thorough. Ye. F. Skorokhodko defines a term as “a word, word-combination or abbreviation that puts a certain notion in a fixed place in the terminological system of the field thus representing in its semantic structure the peculiarities of the object being termed, as well as the interrelations between this object and the other objects of the same system” [8, p. 13].

The main criteria for stating that a word can be considered a term or the underlying characteristics of a term are the following: strict, unambiguous correspondence between the term and the notion, systematization, rational conciseness, ability to form words [6, p. 56]. The following should be taken into account: firstly, a term can exist only as an element of the terminological system, a well-ordered set of terms that correspond adequately to the system of notions of that theory that serve a subject area or human activity; secondly, a terminological system of any field represents a definite multitude of interrelated

elements that create a stable unity and consistency provided with integral properties and regularities. In addition, the specific content of the notion, defined by a certain term, is clear only due to definition – a laconic, logical description which offers the characteristic features of the object. In fact, the definition narrows down the boundaries of the notion and fixes the content of the term that is conveyed in the meaning. The characteristics necessary and sufficient for the definition put the emphasis on the specificity of the notion.

Following the cognitive and discursive definition of the term, given by V. L. Ivashchenko [4, p. 49], a nanoscience term is a word or a word-combination as an inherent element of the nanoscience and nanotechnology terminological system that stand for certain notion of the field and serve as a means of receiving, fixing, storing, processing, transmitting professional knowledge and work experience in the subject area. For scientific convenience “a nanoscience term” is used synonymously with “a nanotechnology term”.

There are many definitions of terminology in the philological literature. The Ukrainian researchers A. S. Dyakov, T. R. Kyyak, Z. B. Kudelko state in their paper that three definitions of terminology have already been given within the framework of modern linguistics: first, the science about terms in general; second, the terms accumulated and used by a nation during its cognitive-intellectual development (so called *termfund*); third, the set of terms (field terminology) or the special vocabulary used in a certain area of science or technology [3, p.11]. Most scientists use the terms “terminology” and “terminological system” synonymously [1]. Nanoscience terminology is the set of language (lexical) units that represent notions which have been formed historically in the field of nanoscience and nanotechnology [9, p. 25].

We consider it necessary to emphasize that nanoscience as the object of research evolved out of interdisciplinary collaborative efforts of physicians, biologists, pharmacologists, biotechnologists, chemists, physicists, electronic engineers, material scientists, etc. Thus, the key terms of nanoscience subfields are translated in order to provide readers with the fundamental knowledge of nanoscience and nanotechnology.

Consequently, the adequate translation of the English terms into Ukrainian is a necessary step to contribute to the national terminography development. We will briefly analyze the procedure of nanoscience terms translation.

Firstly, it is essential to determine the subfield nanoscience term belongs to. This approach is justified by the interdisciplinarity of

nanoscience, which uses the terms taken from medicine (e.g., *nanodrug*; *drug delivery*; *drug nanocrystal*; *drug nanosuspension*), pharmacology (e.g., *dual action drug*; *pharmacodynamics*; *pharmacokinetics*), physics (e.g., *electron density*; *Fermi wavelength*), chemistry (e.g., *chiral compound*), biology (e.g., *biological system*; *biomotors*), mechanics (e.g., *nanotribology*; *statistical mechanics methods*), etc.

Secondly, to put notions into categories: a) objects, materials, instruments, mechanisms, devices, equipment, machinery (e.g., *atomic force microscope*, *nanotube*); b) processes, actions, effects (e.g., *crystallization*, *differentiation*, *energy transfer*); c) properties, states, conditions (e.g., *chirality*, *negative resistance*); d) quantity specifications: physical and geometrical values; dimensions (e.g., *near nanoscale*, *pH (hydrogen ion exponent)*); e) methods (e.g., *electronic structure method*, *top-down nanotechnology*).

Thirdly, to analyze structure and semantics. In the current research terms are divided into: a) one-word-terms subdivided into simple (e.g., *antibody*, *cell*, *footprinting*). They may be built with the help of suffixes (e.g., *catalysis*, *nucleation*, *scattering*), prefixes (e.g., *antibody*, *atom*), suffixes and prefixes (e.g., *immobilization*, *microprocessing*, *nanolayer*, *recombination*), and compound (e.g., *bacteriophage*, *buckyball*, *DNA Microarray*, *waveguide*); b) terminological word combinations (e.g., *chemical deposition*, *membraneless structure*, *metalloceramic coating*); c) multi-component terminological units, which consist of three-, four- and more components (e.g., *quantum cellular automata*, *metal ion implantation*); d) composites (e.g., *nanorobotics*, *hedgehog proteins*, *quantum-dot device*); e) juxtaposites (e.g., *diastereoisomers*, *sol-gel*); f) combined terms (e.g., *ion-exchange chromatography*).

It is important to keep in mind that translation of terminological word-combinations and multi-component terms requires splitting the terminological unit into primary (main) and secondary components (which might consist of more than one word) and should be followed by the analysis of the semantic relations between the secondary components, as well as between the secondary components and the primary (main) component of the terminological unit. At the same time many nanoscience terms contain the international elements of Greek and Latin origin (e.g., *bacteriophage*, *biomembrane*) and the elements borrowed from English (e.g., *capsid*, *nanoindenter*).

Thus, terms translation requires finding possible target language equivalents and choosing the one depending on the use of language in a given situation.

Different translation techniques and methods should be used, e.g., transcoding (e.g., *colloid*, *nanoassembler*, *rotaxane*, *sol*), loan-translation (e.g., *magnetic data storage*, *single-electron transistor*), etc. Lexical, grammatical, and stylistic transformations, as well as their combinations are widely utilized in the process of nanoscience translation:

Landau-Lifshitz torque equation Equation describing the precessional motion of a spin or a magnetic moment in a magnetic field. It is based on the balance between the torques acting on the magnetic moment and the torque provided by the change in time of the magnetic moment, i.e., the time derivative of the angular momentum related to the magnetic moment.

Landau-Lifshitz torque equation / рівняння обертального моменту Ландау–Ліфшиця – рівняння, що описує прецесійний рух спіна або магнітного моменту у магнітному полі. Причиною появи спінових хвиль є порушення спінового порядку, зумовлене відхиленням спіна від рівноваги. Явище засноване на балансі між обертальними поступами, що діють на магнітний і обертальний моменти, за умови зміни в часі магнітного моменту, тобто похідної за часом від моменту імпульсу, пов'язаного із магнітним моментом. Рівняння Ландау–Ліфшиця є основним рівнянням руху спіна у ферромагнітному середовищі [10, с. 135].

The combination of definition analysis and context analysis has been used in translation of polysemantic abbreviations. It should be mentioned that searching for Ukrainian equivalents of the English terms is not an easy task. In some cases it makes sense to provide two synonymous Ukrainian terms to the same English term, e.g.: *extracellular matrix (ECM)*; *carbon nanotube*.

Conclusion. Intensive research in nanoscience, elaboration of research networks, international cooperative studies in this new, developing and most promising field for research requires search for the Ukrainian equivalents to the English nanoscience terms by the Ukrainian scientists and puts special emphasis on the problem of harmonization between nanoscience terminology development and dynamics of modern nanoscience as the corresponding field.

Nanoscience terms translation and development of terminological system in the field of nanoscience should be viewed as contribution to further development of the Ukrainian language. The functioning of the official language in the area of science and technology depends largely on knowledge-driven and cognition-driven development of the

Ukrainian terminology. Terminographical research in the field of nanoscience plays an overwhelmingly important role in formation and consolidation of the Ukrainian professional language. Thus, standardization and normalization of nanoscience terminological system contributes to modern translation terminography development.

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ПЕРЕКЛАД В ГАЛУЗІ НАНОНАУКИ: ТЕРМІНОГРАФІЧНИЙ АСПЕКТ

У статті досліджуються особливості перекладу нанонаукових термінів з англійської мови на українську. Надано визначення нанонаукового терміна та нанонаукової термінології. Розглянуто термінографічні аспекти гармонізації розвитку нанонаукової термінології з динамікою сучасної нанонауки як системи понять спеціальної галузі наукового знання.

Ключові слова: нанонаука, нанонауковий термін, нанонаукова термінологія, переклад термінів.

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ПЕРЕВОД В СФЕРЕ НАНОНАУКИ: ТЕРМІНОГРАФІЧЕСКИЙ АСПЕКТ

В статье исследуются особенности перевода нанонаучных терминов с английского языка на украинский. Даются определения понятиям “нанонаучный термин” и “нанонаучная терминология”. Рассматриваются терминографические аспекты гармонизации развития нанонаучной терминологии с динамикой современной нанонауки как системы понятий специальной отрасли научного знания.

Ключевые слова: нанонаука, нанонаучный термин, нанонаучная терминология, перевод терминов.

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НАВІЩО ПЕРЕКЛАДАЧЕВИ ТЕОРІЯ?