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ИННОВАЦИЯЛЫҚ ШЕШУ ТӘСІЛДЕРІ» X ХАЛЫҚАРАЛЫҚ
ҒЫЛЫМИ-ТӘЖІРИБЕЛІК КОНФЕРЕНЦИЯСЫНЫҢ БАЯНДАМАЛАР
ЖИНАҒЫ**

**СБОРНИК МАТЕРИАЛОВ
X МЕЖДУНАРОДНОЙ НАУЧНО – ПРАКТИЧЕСКОЙ
КОНФЕРЕНЦИИ: «АКТУАЛЬНЫЕ ПРОБЛЕМЫ ТРАНСПОРТА И
ЭНЕРГЕТИКИ: ПУТИ ИХ ИННОВАЦИОННОГО РЕШЕНИЯ»**

**PROCEEDINGS OF THE X INTERNATIONAL SCIENTIFIC-PRACTICE
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THE WAYS OF ITS INNOVATIVE SOLUTIONS»**

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Тематика статей и докладов участников конференции посвящена актуальным вопросам организации перевозок, движения и эксплуатации транспорта, стандартизации, метрологии и сертификации, транспорту, транспортной техники и технологии, теплоэнергетики и электроэнергетики.

Материалы конференции дают отражение научной деятельности ведущих ученых дальнего, ближнего зарубежья, Республики Казахстан и могут быть полезными для докторантов, магистрантов и студентов.



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List of sources used

1. Maksimova I.N. Metrologicheskoe obespechenie stroitel'stva: ucheb. Posobie / I.N. Maksimova. – Penza: PGUAS, 2013. – 336 s. ISBN 978-5-9282-0912-4
2. GOST 22690-2015 Mezhgosudarstvennyj standart «Betony. Opredelenie prochnosti mekhanicheskimi metodami nerazrushayushchego kontrolya»
3. Snezhkov D.YU. Monitoring vozvodimyh i ekspluatiruemyh zhelezobetonnyh konstrukcij nerazrushayushchimi metodami/ D.YU. Snezhkov, S.N. Leonovich. – Minsk: BNTU, 2016. – 331 s. – ISBN 979-985-550-783-4.
4. Snezhkov D.YU., Leonovich S.N. Kombinirovaniye nerazrushayushchih metodov ispytaniya betona / Vestnik Brestskogo gosudarstvennogo tekhnicheskogo universiteta, 2017, № 1. – S. 87-92

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STANDARDIZATION OF MEASUREMENT TECHNIQUES IN THE FIELD OF NANOINDUSTRY

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Nanotechnology and nanoindustry products can qualitatively change people's lives. For example, it becomes possible to turn medicines into targeted agents, protecting healthy tissue from damage or directing them to the focus of inflammation. Great opportunities are also laid in the development of nanoelectronics, «smart» household appliances, long-lasting power supplies, heavy-duty building materials.

According to forecasts, in the next 8-10 years, the market for nanotechnology products will grow by more than 80%, which will require significant development of its element and regulatory framework. In this regard, an effective system of metrology and standardization is needed, consistent with international standards that ensure the reliability of the safety and quality of nanoindustry products.[1]

As you know, it is the level of accuracy and reliability of measurements that can stimulate the development of the relevant sectors of the economy or restrain it. It is especially important that in nanotechnology, the instrument-analytical and technological components work at the limit of their capabilities. This increases the probability of an error related, in addition, to the human factor.

The specificity of nanotechnology has led to the need for the emergence and rapid development of a unique direction in metrology - nanometrology, which reflects all theoretical and practical aspects related to the "correctness" of measurements in nanotechnology, including standards of units of quantities, standard samples of composition, structure, size, properties; methods and means of calibration in the nanometer and subnanometer ranges; implementation of nanoscale and much more, aimed generally at ensuring the uniformity of measurements.[2]

In this regard, metrology and standardization play a special role as key elements of the instrument-analytical, technological and intellectual components of nanotechnology and nanoindustry. The specificity of nanotechnology has led to the need for the emergence and rapid development of a unique direction in metrology - nanometrology, which is associated with theoretical and practical

aspects of the "correctness" of measurements, including standards of units of quantities; standard samples of composition, structure, size, properties; methods and means of calibration in the nanometer and subnanometer ranges; implementation of nanoscale and many other aspects of ensuring the uniformity of measurements.

In solving this main task of metrology - ensuring the uniformity of measurements, i.e. achieving such a state of the measuring infrastructure in which the measurement results are expressed in legalized units and their errors (uncertainties) are known with a given probability – nanometrology relies on measures, standard samples of composition, structure, size, properties to provide almost every piece of equipment with the necessary set of tools that reproduce the desired scale and allow calibration of measuring instruments, including directly in the measurement process, which allows you to control the results of each of them and ensure their traceability to the standard of the corresponding value.

The creation of such reference samples and measures is accompanied by the development of appropriate methods of verification and calibration of themselves and measuring instruments with their use, as well as methods for measuring parameters and characteristics of objects and products of nanotechnology and nanoindustry using these measuring instruments.

One of the primary tasks of standardization in nanotechnology is the standardization of parameters and properties of materials, objects, elements and structures to be measured. Hence, the natural consequence is the need for certified and standardized measurement methods, calibration and verification of measuring instruments used in nanotechnology, and much more, which is determined by the needs of the development of the nanoindustry infrastructure.

A special aspect of standardization is the solution of the tasks of ensuring the health and safety of process operators and persons interacting with nanotechnology products during their production, testing, research and application, up to disposal, as well as environmental safety of the environment.

One of the primary tasks of standardization in nanotechnology is the standardization of parameters and properties of materials, objects, elements and structures of nanotechnology to be measured. It is necessary to have certified and standardized measurement methods, calibration methods and verification of measuring instruments used in nanotechnology.

It is necessary to work on solving the scientific and technical problem of ensuring the uniformity of measurements in nanotechnology.

First, the creation of standard samples of composition, structure, size and properties. Secondly, the creation of new measures. Thirdly, it is the creation of standardized measurement methods in nanometry.[2]

List of sources used

1. Okrepilov V. Standartizaciya i metrologiya v obespechenii bezopasnosti produkcii nanoindustrii/ ZH. Nanoindustriya. Nauchno-tekhnicheskij zhurnal. – Vyp.7, 2013 . – S. 6-12
2. Todua P. A. Nanometrologiya — klyuchevoe zveno infrastruktury nanotekhnologij/ TRUDY MFTI. — 2011. — Tom 3, № 4