THE SIGNIFICANCE OF MATERIALS SCIENCE TERMINOLOGY FOR PHILOLOGICAL STUDIES

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Abstract:

This article explores the development of scientific and technical terminology, its theoretical foundations, and the issues related to the translation process. The diachronic development of terminology, its role in international communication, and the lexicographic principles associated with it are analyzed. The significance of materials science terminology for philological studies is also mentioned with examples

Keywords:
terminology, scientific and technical terms, diachrony, theoretical foundations of terminology, translation theory, semantic development, philological analysis, materials science terminology

Introduction

Although the terminology of materials science primarily belongs to technical fields, its importance for philological research is also remarkable. Every term that enters a language does not only denote a scientific concept but also enriches the vocabulary, introduces semantic changes, and serves as valuable data for comparative linguistic and translation studies. In English, Russian, and Uzbek, the terminology of materials science has become a source for semantic, structural, and etymological investigation. This paper discusses the significance of materials science terminology for philological studies within the IMRAD framework.

Literature Review

The study of terminology has a long tradition. Austrian scholar Eugen Wüster laid the foundations of modern terminology science in the 1930s, emphasizing the

need for international standardization. His work Einführung in die allgemeine Terminologielehre remains a cornerstone in the field.

In Russian linguistics, D. S. Lotte's Osnovy postroeniya nauchno-tekhnicheskoy terminologii (1961) outlined the principles of constructing scientific and technical terminology, while V. V. Vinogradov explored the semantic boundaries of terms. A. Reformatskiy also contributed by defining terms as a distinct lexical layer within the language system.

In Uzbek linguistics, scholars such as Sh. Rahmatullayev (Explanatory Dictionary of Linguistic Terms, 1999), A. Hojiyev, and H. Dadaboyev studied how scientific terms adapt to the Uzbek language.

Materials science itself provides an extensive terminological base. For instance, Callister's Materials Science and Engineering: An Introduction (2014) and the tenth edition of Materials Science and Engineering keeps the same teaching goals as earlier versions: to present the basics at a university level, organize topics logically, and explain concepts in enough detail for independent understanding. It adds helpful learning tools such as photos, objectives, summaries, glossaries, and technology-based methods. New updates include discussions on the materials paradigm, 3D printing, biomaterials, polycrystalline diamond, and recycling. Some chapters have revised examples and explanations (e.g., Hall effect, design problems). Homework problems have also been refreshed. The textbook is available in digital format in addition to print.

Ashby & Jones' Engineering Materials (2012) serve as key sources of modern technical terms like alloy, crystalline, anisotropy, grain size, bonding energy.

In translation studies, P. Newmark's A Textbook of Translation (1988) and V. N. Komissarov's works (1990s) provided theoretical frameworks for equivalence and adequacy in scientific translation. Uzbek scholars such as I. Rasulov, N. Mahmudov, and S. Usmonov have contributed to the study of the adaptation and formation of new scientific terms in Uzbek.

Overall, these works confirm that materials science terminology has not only technical but also significant philological value, especially in the fields of semantics, morphology, etymology, and translation theory.

Methodology

This study applies the following methods:

1. Comparative analysis – comparing English, Russian, and Uzbek materials science terms.
2. Semantic analysis – identifying core and extended meanings.
3. Etymological analysis – tracing the origins of terms (Latin, Greek, English, Russian).
4. Translation theory approach – analyzing equivalence, adequacy, and functional translation methods.
5. Statistical approach – measuring the percentage of terms borrowed from different languages.

Results

1. Lexical contribution: materials science terms enrich the Uzbek vocabulary, e.g., grain size – don hajmi, bonding energy – bog‘lanish energiyasi.
2. Semantic contribution: most terms are confined to scientific discourse, though some (alloy – qotishma) are entering general usage.
3. Morphological adaptation: terms often enter Uzbek through phonetic assimilation (crystalline – kristallik, anisotropy – anizotropiya).
4. Translation value: studying these terms strengthens students’ skills in technical translation and comparative linguistics.
5. Educational value: such terms provide practical material for courses in lexicology, semantics, and translation studies.

Discussion

Findings reveal that materials science terminology contributes to philological studies in three main ways:

1.Theoretical: offering material for linguistic analysis of semantics, morphology, and functions.
2. Practical: supporting translation of technical texts into Uzbek with higher accuracy.
3. Didactic: enriching philological education by training students in comparative and terminological analysis.

However, challenges still remain. Some terms are inconsistently adapted into Uzbek (e.g., superinvar, diamagnetic, amorphous), leading to parallel usage of untranslated and adapted forms. This creates ambiguity in both technical and

philological contexts.

Conclusion

Materials science terminology is highly beneficial for philological research. It:

- expands the vocabulary of the Uzbek language;
- provides material for comparative analysis;
- enhances translation theory and practice;
- serves as a valuable resource in philological education.

Future research should focus on compiling bilingual explanatory dictionaries, deepening etymological studies, and standardizing translation practices of materials science terms.

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