Concise Dictionary of Materials Science: Structure and Characterization of Polycrystalline Materials

Vladimir Novikov
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This reference work covers the terminology of materials science—or more specifically, as the subtitle suggests, the terms relevant to the structure and characterization of polycrystalline materials. About 1300 terms are included, plus about 300 more that are simply cross-references to a preferred synonymous term that *is* defined.

As the title says, this coverage is concise, as compared with the number of terms published in six other dictionaries or glossaries of materials science: 6500 terms in (1) *Chambers Materials Science and Technology Dictionary* (Chambers Harrap Publishers, Edinburgh, UK, 1993); 4000 terms in (2) *Dictionary of Materials Science and High Energy Physics* (CRC Press, Boca Raton, 2001); 20,000 terms in (3) *Materials, Science and Engineering Dictionary* (Spell Check-It, Ware, UK, 2002); 11,000 terms in (4) *McGraw-Hill Dictionary of Materials Science*, derived from the *McGraw-Hill Dictionary of Scientific and Technical Terms* (McGraw-Hill, New York, 2003); 7500 terms in (5) *ASM Materials Engineering Dictionary*, including 700 figures, 250 tables, and 64 technical briefs (mini-essays on a subject, e.g., "superalloys") (ASM International, Materials Park, Ohio, 1992); and more than 6000 terms in (6) *Dictionary of Metallurgy* (John Wiley & Sons, New York, 1998). Admittedly, some of these have a broader scope than V. Novikov's book. In addition, modest glossaries are available on-line, for example: *UMIST Materials Science Glossary*, from the University of Manchester, which carries ~500 terms (www2.umist.ac.uk/material/teaching/aero/ML2041/coursework/glossary.htm); *MATTER Glossary of Materials Science*, from the University of Liverpool, which carries ~500 terms (http://www.matter.org.uk/glossary/); *A Materials Science and Engineering Glossary of Terms*, by Justin McCarthy, ~400 terms (www13. brinkster.com/justinmc/glossary/); and *MatWeb Glossary of Materials Terms* (for registered and premium users only), ~600 terms (www.matweb.com). These on-line sources were not critically evaluated for this review.

Novikov obtained his doctorate degree in materials science at the Moscow State Institute of Steel and Alloys. He taught metallurgy for over 30 years and also has extensive consulting experience. He now lives and works in Germany. In addition to more than 100 published papers, Novikov is the author of two metallurgical monographs. He is thus well able to expand these definitions in such a way as to present a coherent idea of structure formation at all levels and its relevance to materials properties. The book will therefore be useful, not only to those studying, researching, or applying materials, but also to nontechnical readers such as managers, purchasing agents, and marketing specialists who have a need to understand materials terminology. Novikov's command of the English language in crafting the definitions of terms is impressive; the text in no way resembles the clumsy translations usually encountered. A useful addendum to the book is a 75-page English–German and German–English glossary of the terms included in the main body of the book. Given the author's background and the current importance of the Russian materials literature, it is surprising that he failed to incorporate a comparable English–Russian and Russian–English glossary as well.

The terms themselves are arranged alphabetically and set in bold type. The definitions are in regular type, but any terms within the definition that appear elsewhere in the dictionary are italicized. Some definitions are admirably concise, one-sentence expressions, but other entries are mini-essays of 5–10 sentences on the subject. About 45 line-drawing illustrations are included to clarify certain concepts. Curiously, some of these are used in several different places to illuminate *different* terms. For example, the same illustration of a hypothetical phase diagram is used for four different terms: *binodal, decomposition, miscibility gap*, and *spinodal*. Yet, strangely, other terms that seem to cry out for an illustration, such as *dislocation*, were not provided one. Other commendable features of the book are its recommended reading list of ~40 texts and monographs on materials science, a list of common symbols (95 items), and a list of acronyms (62 items). Unfortunately, the latter does not even include all those used in the body of the work; for example, CSL, GB, RHEED, and RT are omitted. An interesting feature that might have embellished the work would have been the identification of the numerous eponymous individuals connected with the listed terms, for example, Coble, Frank, Goss, Hume-Rothery, Köster, Kossel, and Laves. I detected only a few printing errors, such as "quench-in vacancies" for "quenched-in vacancies" and "spinal decomposition" for "spinodal decomposition."

To better assess the quality of coverage and the definitions themselves, I tested a random selection of 10 terms from Novikov's dictionary (*acicular, diffusion creep, edge dislocation, flake graphite, glissile, Laves phase, monotectic, quasi-crystal, smectic crystal,* and *Taylor factor*) and compared these with the coverage in three other materials dictionaries (1, 4, and 5, as identified earlier). Surprisingly, despite the fact that Novikov's is the smallest of the four in the sense of numbers of terms included, only three terms of the sample set were found in Chambers (1), six in McGraw-Hill (4), and four in ASM International (5). Where a direct judgmental comparison could be made, Novikov's definitions were found to be superior in 11 of 13 cases, equivalent in one, and inferior in only one!

In summary, the book is authoritative, clear, and more extensive than available on-line glossaries, but somewhat less so than some current reference works. The book has generally superior definitions, as compared with the others. The price of the book is comparable to that of some of the hardbound volumes (5, 6), but much more expensive than other hardbound volumes (2, 3) and both of the paperback volumes cited (1, 4).

Reviewer: *Jack H. Westbrook is owner of and principal consultant with Brookline Technologies, a consulting firm in Ballston Spa, N.Y., where he consults on materials and technical information systems. He was an early pioneer in research on intermetallic compounds as potential high-temperature structural materials and also has strong interests in the history of science and technology. He serves on the* MRS Bulletin *editorial board.*

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