# Evaluated Materials Property Data

*Reliable data form the cornerstone of materials research and advanced engineering designs. Capturing and assessing materials property data from multiple sources is a key effort in responding to this critical national priority.*

Ronald G. Munro

The concurrence of two rapidly advancing technologies, materials science and internet communications, has created the potential for a crisis in the reliability of available materials property information. Once, researchers and designers relied on handbooks and data compilations that were carefully and thoughtfully produced through dedicated and deliberately organized efforts. The magnitude of the effort, the expense, and the time consumed from design to production combined to form an effective quality filter on the results. Efforts not undertaken with a serious and sober intent were strongly deterred by the inevitable costs and commitments.

Now, researchers and designers increasingly turn to the internet for instant access to whatever information is required. The ready accessibility of the internet, however, is as much a weakness as it is a strength. The internet provides a broad open forum where ideas and results can be exchanged and disseminated with remarkable ease, relatively little financial burden, and scarcely any delay between the realization of an idea or result and its expression. Unfortunately, the facility with which information can be conveyed on the internet lacks the inherent process filter that once served as a useful safeguard on the quality of the information content.

The success of the internet in allowing more individuals to communicate more directly and effectively ironically may also cause older information sources to become relatively inaccessible. The materials information populating the internet's information forums represent current efforts. Older information sources, such as handbooks, that have not been adapted to the internet may soon be overlooked or abandoned.

NIST is responding to the full range of challenges presented by these circumstances. The key to reliable data, whether in handbooks or on the internet, is data evaluation. NIST has accepted the responsibility of providing evaluated data on the internet and has taken the lead in educating data users about the methods and significance of data evaluation. Most notably, more than a decade of development and experience in evaluation methodology has been summarized in a new NIST Recommended Practice Guide, SP960-11. (For more information about this Guide, see *Data Evaluation Theory and Practice* in the Technical Highlights section of this report.)

Efforts in the Ceramics Division to provide evaluated data on the internet are focused on the sustained development of the Ceramics WebBook. Currently, three data systems are maintained: Standard Reference Database Number 30, the Structural Ceramics Database (SCD); Standard Reference Database Number 62, High Temperature Superconductors (HTS); and a collection of topical compilations called Property Data Summaries (PDS).

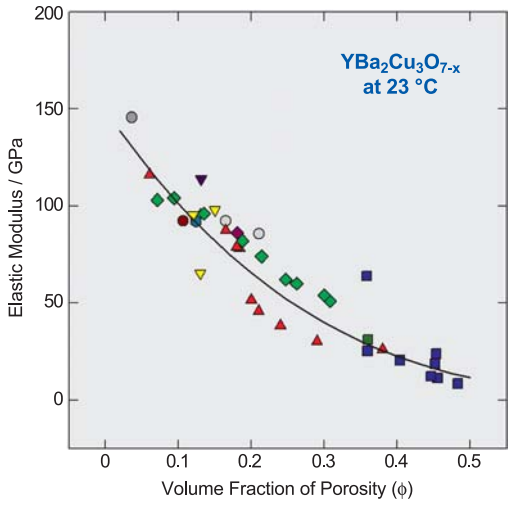


***Figure 1:*** *The elastic (Young's) modulus at room temperature for polycrystalline specimens of the high temperature superconductor Y:123.*

In FY 2003, two additions were made to the Ceramics WebBook. The compilation, *Elastic Moduli Data for Polycrystalline Ceramics*, NISTIR 6853, consisting of approximately 4000 data points, was added to the PDS collection. This collection exhibits the dependence of the elastic moduli (*E, G, B, ν*) on temperature and porosity for approximately 50 ceramic compositions (*e.g.*, Figure 1). A data update was also completed for the Structural Ceramics Database. This update increased the number of citations in the SCD by 100, bringing the total to 834 citations and approximately 38000 data points.

## Contributors and Collaborators

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