

## **Materials Constitution: The Need for Critical Evaluation**

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**Abstract:** To know the phases that might co-exist stably or meta-stably in a materials system is mandatory in many research challenges, and it is equally important in engineering applications. Many hundred thousands of phase diagram related data, published in the past, provide today's bases for innovative research to verify thermodynamic simulations and to guide experiments and alloy development. From the current research thousands of new publications are added to the collective world knowledge, every year. And their number is continuously increasing. Critical evaluation procedure developed by the MSIT<sup>®</sup> (Materials Science International Team) offers a reliable and efficient strategy that allows to evaluate many often-conflicting data on the phase diagrams and thermodynamics of phases, and describe entire material systems. The main aim of critical evaluations is to produce in a concise and easily readable form a set of self-consistent phase diagrams and thermodynamic properties that represent the current (best) state of the knowledge of a particular system.

The results of these activities of the MSIT are accessible from MSI Eureka - the world's largest knowledge base on materials constitution for inorganic materials. MSI Eureka contains information on unary, binary and multicomponent systems, for many materials classes. Today, its electronic content includes over 460,000 entries related to more than 73,500 material systems and is continuously updating and growing.

The presentation highlights the span of different experimental techniques used for phase equilibria determination and explains the necessity and the concept of the intellectual critical evaluation of the often-conflicting individual data.

The presentation gives an overview of different data categories in MSI Eureka and demonstrates how it can be useful in materials R&D.