MAR12-2011-000730

Abstract for an Invited Paper
for the MAR12 Meeting of
the American Physical Society

**An Enlightened Combinatorial Search for New Superconductors**[1]

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I describe a methodology for the fast search for new superconducting materials. This method consists of a parallel synthesis of a highly inhomogeneous alloy covering large areas of the metallurgical phase diagram combined with a very sensitive, fast, microwave-based method, which allows large non-superconducting portions of the sample to be discarded. Once an inhomogeneous sample containing a minority phase superconductor is identified, we revert to well-known, thorough identification methods, which include standard physical and structural methods. We show how a systematic structural study helps in avoiding miss-identification of new superconducting materials when there are indications from other methods of new discoveries. The application of these ideas to the La-Si-C system, which exhibits promising normal state properties, sometimes correlated with superconductivity, will be discussed. Although this system shows indications of a new superconducting compound, the careful analysis described here shows that the superconductivity in this system can be attributed to intermediate binary and single phases. Searches in other Rare Earth-Si based systems will also be described. Work done in collaboration with J. de la Venta, Ali C. Basaran, J. G. Ramirez, T. Grant, A. J. S. Machado, M. R. Suchomel, R. T. Weber, Z Fisk, P. Guptasarma, O. Shpyrko and D. Basov.

[1]Work supported by an AFOSR MURI grant.