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## **High Magnetic Anisotropy Nano-Composites and Applications**

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Magnetic anisotropy is one of the basic properties of magnetic substances. In particular, magneto-crystalline anisotropy is thought to be intrinsic for bulk materials, but the theoretical understanding is not satisfactory, as is often demonstrated. In multilayers and nanoparticles where surface or interfacial magnetic anisotropy plays a key role, magnetic behavior is significantly influenced by extrinsic or induced magnetic anisotropy. Among many alloy systems, ordered alloys are known to exhibit high magnetic anisotropy; in particular the L10 ordered phase is of great interest because of applications in bit-patterned magnetic data storage.

Nanocomposite particles with a high magnetic anisotropy phase, together with other magnetic anisotropies, are the subject of intensive research since they offer potential for various applications such as hybrid data storage, sensors, and bio-devices.

This tutorial lecture addresses the magnetism and structure of thin films and nanocomposite particles with a high magnetic anisotropy ordered phase. An in-depth review of magnetic anisotropy in representative materials is given. Recent developments in high magnetic anisotropy of novel materials, multilayers, and nanocomposites will be presented. Emphasis is placed on quasi-L12 structured alloy films with very high magnetic anisotropy and on FePt/FeRh nanocomposites of the first-order transition type, in conjunction with possible applications.



**Takao Suzuki** received the B.S. and M.S. from Waseda University, Tokyo, in 1962 and 1964, respectively, and the Ph.D. from California Institute of Technology in 1969. He was a postdoctoral fellow at Max-Planck Institute in Stuttgart from 1969 through 1972, and was an associate professor at Tohoku University from 1972 through 1988, where his research interests included magnetic multilayers with high magnetic anisotropy for magneto-optical recording, and magnetic recording applications.

From 1988 through 1995 he worked as a research staff member at IBM Almaden Research Center in San Jose, California, and was involved with high density magneto-optical and magnetic recording materials developments. In 1995 he joined Toyota Technological Institute in Nagoya, Japan, as a principal professor. Dr. Suzuki is now a vice president and a principal professor of the Institute, and also director of the Academic Frontier Center sponsored by the Japanese Ministry of Education, Science, Sports and Culture. His current research interests include the magnetic anisotropy and structure of ordered alloy thin films and nanoparticles, and high density perpendicular magnetic recording media applications. He has published more than 260 scientific papers, has written four books, and has 17 patents.

Professor Suzuki is Fellow of the IEEE. He has been active in many Intermag and Magnetism and Magnetic Materials conferences, including serving as program co-chair of MMM in 1995, and as treasurer co-chair of Intermag in 2005. He has served as a member of the Administrative Committee of the IEEE Magnetics Society for several terms. He is on the Editorial Board of IEEE TRANSACTIONS ON MAGNETICS and is an advisory editor of the Journal of Magnetism and Magnetic Materials.