T_CSAM Bi-Weekly Brown Bag Seminar

Texas Center for Superconductivity and Advanced Materials

Dr. Dmitri Litvinov

Electrical and Computer Engineering
University of Houston

"Nanoscale Magnetic Recording"

Friday, September 5, 2003

University of Houston Science Center
Room 102
12:00 p.m. – 1:00 p.m.

Abstract:
Magnetic recording is rapidly shifting into the realm of nanoscale technologies. At 1 Terabit/in^2, the size of a recording bit is 50x13nm^2 (assuming 4:1 bit aspect ratio.) To store such small magnetic features, the characteristic dimensions of all supporting recording system components have to be shrunk correspondingly. The read/write transducers are being scaled down into 40nm range. The characteristic size of the smallest magnetic feature in a recording medium is being refined to hit the 5nm mark. The flying height of the recording heads is targeted to be a few nanometers at the most. The servoing capabilities of the tracking system are being optimized for the capability to position a recording transducer on a 3.5" diameter media disk with a precision of 10nm in a fraction of a millisecond. This presentation will review the major critical issues related to the recording physics, device fabrication, and system integration at nanoscale. The prospects of extending magnetic recording technologies above Terabit/in^2 range as well as alternative approaches to data storage and retrieval will be discussed.

Among the open issues critical to the development of nanoscale probe recording is the ability to fabricate magnetic transducers with the dimensions in the nanometer range as well as the detailed understanding of the recording physics of such nanomagnetic devices. Magnetic probe heads with a cross-section of 60x60nm^2 were successfully fabricated using focused ion-beam (FIB) processing. The ability of such probe heads to controllably conduct magnetic flux is critical to the performance of a recording system. The results of both experimental and theoretical study of micro/nano-magnetic behavior of fabricated nanoscale probe heads will be reported. The recording demonstration using 60nm wide magnetic nanowriters will be presented. The key advantages of FIB technology with respect to magnetic materials processing will be reviewed. The resolution limits and Ga+ ions interaction with magnetic materials will be discussed.

Bio:
PhD in Applied Physics, University of Michigan, Ann Arbor – 1999; M.S. in Engineering, University of Michigan, Ann Arbor – 1997; M.S. in Physics, University of Miami, Coral Gables – 1994; B.S. in Applied Physics, Moscow Institute of Physics and Technology – 1992. Joined Seagate Research in 1998 among the first hires directly recruited by Seagate's upper management. Joined University of Houston in 2003. 3 issued and 27 pending patents. More than 40 publications in Engineering and Scientific journals, numerous invited and contributed presentations at international conferences. Represented Seagate at Lake Arrowhead conference, a meeting of 40 key leaders in magnetic data storage. Co-founder and organizer of North American Perpendicular Magnetic Recording Conference.

Persons with disabilities who require special accommodations in attending this lecture should call (713) 743-8210 as soon as possible.

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