CRADA Final Report
CRADA No. BG98-217 (00)

1. Parties:
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   Industry Partner: CVC, Inc., acquired by Veeco

   At inception of CRADA, industry partner was:
   CVC, Inc.
   3100 Laurelview Court
   Fremont, CA 94538

2. Title of the Project: Tailored Microstructures in Advanced Materials for Information Storage

3. Summary of Research:

   Immediately after this CRADA was funded the information storage industry was struck by a major economic downturn. CVC Inc. was not interested in initiating any new projects. In fact, at that time it was in secret discussions with, and was eventually acquired by, Veeco. On our part, unaware of these developments, we continued to develop the necessary instrumentation to explore the synthesis of novel tunnel junction materials/architectures for information storage and their characterization by sophisticated electron microscopy techniques. We did not receive the necessary materials for our studies from CVC but were able to turn to Dr. J. Moodera of MIT who provided us with novel tunnel junctions made with AlN as a barrier. These samples were prepared as thin film cross-sections for TEM investigation, a very time-consuming process. They were then investigated by electron energy-loss spectroscopy. Both plasmon resonances and inner shell excitations were investigated. A new software code was developed to carry our Kramer Kronig analysis of low-loss EELS spectra with the goal of correlating the local dielectric constants measured using a nanometer size electron probe with the tunneling characteristics. The results of the study, in the limited time available were inconclusive.

4. Deliverables achieved: Development of appropriate software for Kramer Kronig analysis of low-loss EELS spectra. This software is now readily available at the NCEM for future users of the Center.

5. Publications and/or presentations: NONE

6. List of software developed

Kramer Kronig analysis software now available at the NCEM

7. Abstract:

A number of tunnel junctions using aluminum nitride and aluminum oxide as barriers were investigated by cross-sectional TEM using electron energy-loss spectroscopy. Kramer-Kronig analysis resulted in the ability to obtain the complete dielectric spectrum of the 1-2nm thick barrier layer. The goal of the study was to correlate the barrier dielectric properties with the performance of the tunnel junctions. The study was inconclusive.

8. Financial Contributions to the CRADA

DOE Funding to LBNL	$ 27,000
Participant Funding to LBNL	$ 10,000
Participant In-Kind Contribution Value	$ 65,000
Total of all Contributions	$102,000

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