



INDUSTRIAL PARTNERSHIP
— FOR RESEARCH IN —
INTERFACIAL AND MATERIALS ENGINEERING

Magnetic Heterostructures Program

Magnetism is the basis for many present, near term and future technologies, including magnetic read heads, magnetic recording media, next-generation memory systems such as magnetic RAM (MRAM), giant magnetoresistance RAM (GMRAM) and spin dependant tunneling (SDT) memory, and prospective computer architectures based on spintronics.

Progress in advanced magnetics technology and spintronics is predicated on a fundamental understanding of spin physics and a thorough elucidation of the influence of dimensionality, defects, and band structure on spin/magnetization dynamics. Specifically, the roles of nanoscale interface structure and defects in spin injection, spin life-times, magnetization reversal dynamics, and exchange coupling must be firmly established.

Further advances in this regard can only be achieved through collaborative efforts that blend the synthesis and characterization of novel materials and interfaces, the design of new magnetic probes with both spatial and temporal resolution, and the use of theories targeted at interfacial phenomena.

The tools available to accomplish these goals include both MBE and UHV sputtering systems for the manufacture of high quality magnetic Heterostructures, complete characterization of the grown materials, including high resolution TEM, measurements of the magnetic and other physical properties which include dynamics studies in the psec regime and 30 nm spatial resolution of magnetic domains. Some of the other magnetic characterization includes transport and tunneling measurements. Synergistic with the experimental efforts is the theoretical studies of the effects of the band structure and a microscopic explanation of physical properties. Many of the graduate students' research projects have close interactions with magnetics industries.

Principal Investigators and their primary areas of expertise:

[Paul Crowell](#)

Program Leader

Spin transport, magnetic dynamics

[Dan Dahlberg](#)

Thin film magnetism, transport, MFM

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Electron tunneling / transport, MBE

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Magnetic thin films / heterostructures, transport

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MBE, CBE, thin film characterization

[Bethanie J. H. Stadler](#)

Magneto-optical materials, thin film properties

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Theory and modeling of magnetic materials

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Computational solid state theory

Contact

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