



## Research Assignment - 2008

Principal Investigator Nian Sun

Title Assistant Professor

College/Department COE/ECE

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Title of research assignment

Magnetic, ferroelectric, and multiferroic film materials and micro-devices

Research abstract

Our research areas include different topics, such as magnetic and electronic thin films and micro-devices for RF and microwave applications, magnetic nanotechnology, magnetic sensors, magnetic semiconductors for spintronics applications, micro- and nano-fabrications. We will try our best to match the interests of the RET participants with the different projects in my group. The active projects are:

1. Spin-spray coating of multiferroic films
2. Integrated magnetic microstrip filters
3. Magnetically tunable inductors
4. Tunable band-pass/stop filter with magnetic films
5. Patch antennas with ME composites
6. High anisotropy soft magnetic films
7. Planar magnetic circulators with metal magnetic films
8. Giant magnetization Fe<sub>16</sub>N<sub>2</sub> thin films
9. Fe doped Ge magnetic semiconductor films
10. Programmable self-assembled magnetic nanowires arrays
11. Synthesis and characterization of magnetic semiconductor nanowires
12. Magnetoelectric devices: tunable transformer
13. Low loss ferroelectric materials
14. Oriented Z-type ferrites for patch antenna applications
15. Magnetoelectric composite substrate for patch antenna applications
16. Magneto-optical Kerr microscopes and hysteresis loopers
17. Anodic oxidization of nanoporous alumina membrane

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## 18. Dispensing and chemically functionalizing Ni magnetic nanowires

RET participants can feel free to choose any topic(s) among the listed projects according to his/her own interests. Further information is available by contacting Nian Sun at phone: 617-373-3351 or by email at: nian@ece.neu.edu.

### Research activities/experience

RET participants will be working in the Center for Microwave Magnetic Materials and Integrated Circuits at the Electrical and Computer Engineering Department. This is a friendly environment with 4 faculties, 3 post doctoral scientists, ~15 graduate students, ~15 undergraduate students.

RET participants will get unlimited access to discussions with the faculties for research guidance, and well trained on all facilities needed for the research project. We typically pair each of the RET participants with one post doctoral scientist and one experienced graduate student for the daily training of all facilities in our labs, data analysis, and technical writing.

Typical research experience involves materials preparation, characterization, device fabrication and characterization, data analysis, and technical paper writing. Research results will be submitted to technical journals for publishing.

### Expectations of RET

We have a quite flexible schedule depending on individual preferred arrangements. We do hope that the RET participants be in the labs on a regular basis. We expect that the research results will appear in technical journals.

Special skills or interests that would help a RET participant with this assignment (i.e., an interest in physics, experience with specific laboratory equipment, etc.)

Interests in physics and hands-on experiments with materials synthesis, device fabrication, characterization, and data analysis.

Lab safety/issues unique to this laboratory. A general Lab Safety Overview will be presented by Environment Health and Safety to both RET and YSP participants prior to the beginning of lab assignments.

A general Safety Overview from Environment Health and Safety is enough.

Suggested literature to be reviewed prior to beginning this research assignment.

General knowledge of university physics and chemistry. Will provide specific literature for different research topics later.

Research/Lab Summer Hours

9:0 a.m. – 5:0 p.m.

Monday through Thursday  
 Monday through Friday

Scheduled Research/Lab Meetings 3:30 p.m. – 5:0 p.m.

Daily  
 Monday  
 Tuesday

Wednesday  
 Thursday  
 Friday

To be  
determined

Lab/research project URL

[www.ece.neu.edu/faculty/nian](http://www.ece.neu.edu/faculty/nian)

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