Syllabus of magnetic thin films: film growth, characterization, and simulation

Wednesday 3:20-6:10pm(?) **Spring 2018**
Instructor: 歐陽淳厚(浩) **(Office: M201/nano-alloy lab)**

Purpose:
Comprehensive introduction to the field of magnetic films: Introduction to ferrimagnetism, film growth, characterization, and simulation

Reference book:
1. Materials Science of Thin Films, 2nd ed. by M. Ohring (Academic press, 歐亞書局 (02)8912-1188分機104),
2. Transmission Electron Microscopy & Diffraction of Materials, 3rd ed. by B. Fultz & J.M. Howe **(**Springer偉明圖書02-23638586**),**
3. **Introduction to magnetic materials**
by B.D. Cullity and C.D. Graham (2009)
4. Molecular Modelling/principles & applications, 2nd ed. by Andrew R. Leach

Outline:

1. **Introduction**
2. **Vacuum science & technology1** (kinetic theory, transport & pumping)
3. **Vacuum science & technology2** (vacuum pumps, vacuum systems)
4. **PVD** (physical vapor deposition: evaporation, sputtering, e.t.c.)
5. **CVD** (chemical vapor deposition: thermal CVD; plasma-enhanced CVD))
6. **Practice**
7. **Film structure1** (structural morphology, computational simulations)
8. **Film structure2** (grain growth, texture, microstructure controls in thin films; constrained film structures)
9. **Examine** (Midterm)
10. Introduction to ferrimagnetism (Magnetic anisotropy)
11. Introduction to ferrimagnetism (Domains and the magnetization process)
12. Introduction to ferrimagnetism (Domains and the magnetization process)
13. Introduction to ferrimagnetism (Domains and the magnetization process)
14. Introduction to ferrimagnetism (Domains and the magnetization process)
15. **HRTEM6** (general)
16. **Simulations1** (Monte Carlo simulations)
17. **Simulations2** (ab initio method:density functional theory)
18. **Reports**

Office hour: Mon. or Wed. 7:00pm

Grading: Midterm (45-50%), Presentation (45-50%), Homework (0-10%).

Teacher's Assistant: (C.-C. Chi, M218/Materials Science: Monday/7:00 pm).
(attainable website: **http://moodle.nthu.edu.tw**)