Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Magneto-optical properties of Fe thin films in an external electric field[1] KOHJI NAKAMURA, TORU AKIYAMA, TOMONORI ITO, Mie University, MICHAEL WEINERT, University of Wisconsin - Milwaukee, ARTHUR FREEMAN, Northwestern University — Controlling magnetic properties by an external electric field (E-field) is a key challenge in magnetic physics. Previously, from first-principles calculations,[2] we demonstrated the E-field-driven magnetocrystalline anisotropy modification in Fe thin films and at the Fe/MgO interface. Here, we extend our investigations to treat the magneto-optical properties of Fe thin films in an E-field. Calculations were carried out using the film-FLAPW method[3],in which an E-field is incorporated and the conductivity tensor is obtained by applying the Kubo formula of linear response theory. Results predict that for an Fe monolayer, when the E-field is introduced over 1V/Å, the calculated interband conductivity in the low energy region (less than about 2eV from E_{F}) are modified compared to that in zero field, due to a magnetization reorientation from out-of-plane to in-plane. The calculated plasma frequency is also found to be reduced by 7%, which suggests an E-field-driven magnetoresistance.

[1]Work at Northwestern University was supported by the U.S. Department of Energy (DE-FG02-88ER45372).
[2]Nakamura, Shimabukuro, Fujiwara, Akiyama, Ito, Freeman, PRL**102**, 187201(2009); Nakamura, Akiyama, Ito, Weinert, Freeman, PRB**81**, 220409R(2010)
[3]Wimmer, Krakauer, Weinert, Freeman, PRB**24**, 864(1981); Weinert, Wimmer, Freeman, PRB**26**, 4571(1982)

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Date submitted: 10 Nov 2011 Electronic form version 1.4