Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Direct Imaging the Thermally Excited Magnon Driven Domain Wall Motion in Magnetic Insulators WANJUN JIANG, PRAMEY UPADHYAYA, YABIN FAN, JING ZHAO, ROBERT SCHWARTZ, KANG L. WANG, Electrical Engineering Department, UCLA, ELECTRICAL ENGINEERING DEPARTMENT, UCLA TEAM — Experimental demonstrations of domain wall (DW) motion induced by the thermally excited magnons in YIG are revealed by applying spatial/temporal resolved polar MOKE imaging in the presence of various temperature gradients. These results include: (1) the DW moves from the cold regime towards the hot regime (for both positive and negative temperature gradients); (2) a threshold temperature gradient (5 K/mm), *i.e.*, a minimal temperature gradient required to induce DW motion; (3) the linear relation of the average DW velocity with the (positive/negative) temperature gradients. Our results suggest that DWs in insulating magnetic materials can be effectively manipulated by a magnonic STT simply by applying small temperature gradients. Further efforts are required to understand this exciting phenomenon, such as quantifying the thermally excited spin wave spin current J_m, resolving the reflection, and transmission of J_m across the DW. Nevertheless, our observations demonstrate that, by incorporating thermal effect into DW engineering, insulating magnetic materials could potentially enable many devices for information processing and other applications in spin caloritronics.

Wanjun Jiang
Electrical Engineering Department, UCLA

Date submitted: 19 Dec 2012 Electronic form version 1.4