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Ultrafast magnetization dynamics in heterogeneous granular FePt media PATRICK GRANITZKA, ALEXANDER REID, EMMANUELLE JAL, TIANMIN LIU, SLAC - National Accelerator Laboratory, WILLIAM SCHLOTTER, SLAC - Linac Coherent Light Source, PADRAIC SHAFER, LBNL, VIRAT METHA, OLAV HELLWIG, HGST, YUKIKO TAHAKASHI, National Institute for Materials Science, Japan , ERIC FULLERTON, UCSD, Center for Magnetic Recording Research, JOACHIM STOHR, HERMANN DURR, SLAC - National Accelerator Laboratory — Granular FePt in the $L1_0$ phase is a key material for future magnetic data storage devices, supporting stable magnetic domains less than 10 nm in diameter. To switch the magnetization of magnetically hard materials like FePt, new writing techniques are needed such as Heat Assisted Magnetic Recording (HAMR). However, it is not known how HAMR works on the fundamental length and time scales of magnetization in FePt. Here we investigate the nanoscale aspects of magnetization dynamics in FePt HAMR with fs X-ray pulses from the Linac Coherent Light Source at Stanford using resonant X-ray diffraction. We show that while many spins display switching in a magnetic field following a fs duration optical excitation. The remaining spins do not switch. Surprisingly the ratio of spins that switch to spins that do not, stays constant over a large fluence range. Furthermore we observe that the spin reservoir which displays heat assisted magnetic recording is quenched homogeneously over the size distribution of grains, while the spins that do not follow the field display a length-scale dependent quenching.

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