Supplementary information for "Static and dynamic magnetization control of extrinsic multiferroics by the converse magneto-photostrictive effect."

Matthieu Liparo,[1,2] Jean-Philippe Jay,[1] Matthieu Dubreuil,[1] Gaëlle Simon,[3] Alain Fessant,[1] Walaa Jahjah,[1] Yann Le Grand,[1] Charles Sheppard,[2] Aletta R. E. Prinsloo,[2] Vincent Vlaminck,[4] Vincent Castel,[4] Loic Temdie-Kom,[4] Guillaume Bourcin,[4] David Spenato,[1] and David T. Dekadjevi[1,2]

[1] *Univ. Brest, Laboratoire d'Optique et de Magnétisme (OPTIMAG), EA 938, 29200 Brest, France*

[2] *Cr Research Group, Department of Physics, University of Johannesburg, PO Box 524, Auckland Park 2006, South Africa*

[3] *Univ. Brest, Service général des plateformes technologiques, Service RMN-RPE, 29200 Brest, France*

[4] *IMT-Atlantique, Campus de Brest, Département Micro-Ondes, Technopole Brest-Iroise, CS83818, 29238 Brest Cedex 03, France*

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Figure S1 shows a scheme of the experimental set-up for static measurements.

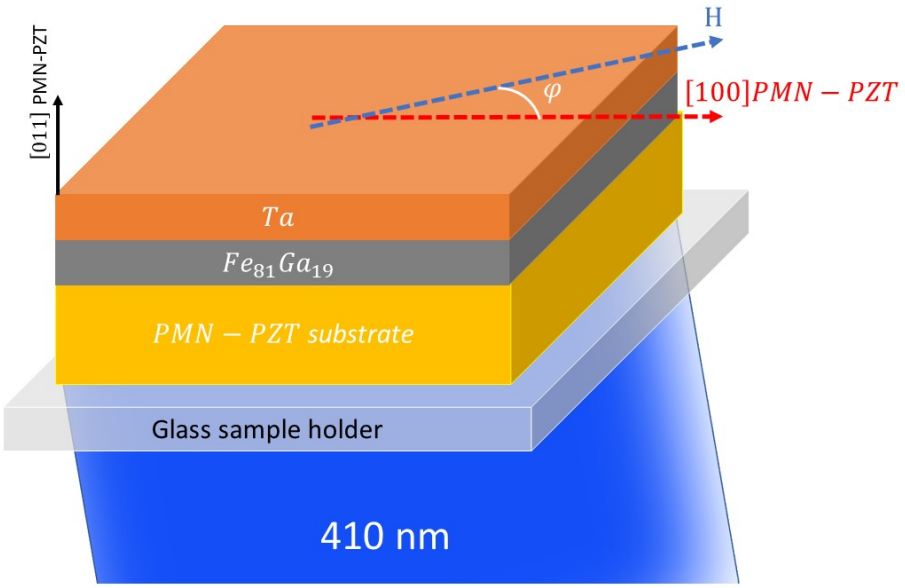

Figure S 1. Schematic drawing of the ME composite consisting of the magnetostrictive FeGa and the (011)-oriented PMN-PZT substrate. The configuration of measurement is also indicated using φ, the angle between the applied magnetic field H (dashed blue axis) and the [100] direction of the substrate (dashed red axis).

Figure S2 (a) and (b) show the entire M-H loops which were zoomed to obtain Figure 1(a) and (b) of the manuscript.

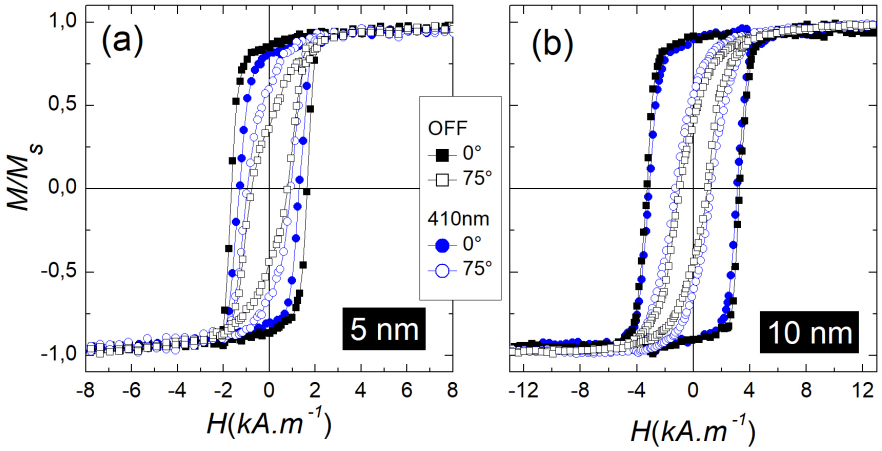

Figure S 2. The entire MH loops of the normalized magnetization reversal of the Ta(10 nm)/FeGa(5 nm ; 10 nm)/PMN-PZT(0.3 mm), measured in-plane with the magnetic field H respectively parallel to [100] ($\varphi = 0°$, i.e. along the deposition field axis H_{dep}) and $\varphi = 75°$, under MPE (i.e. under illumination at 410nm) and in the dark state (OFF) materials.

Figure S3 shows the time evolution of M-H loops under sample illumination for the 10 nm FeGa sample at $\varphi = 0°$. The illumination started at $t = 0$ s and a delay time of 45 s was set before starting the first M-H loop measurement. Each M-H loop took 150 s to be obtained. (In the manuscript, a given MH loop corresponds to the average of 5 MH loops. Thus, it took 5×150 s= 750 s to record each M-H loop presented in the manuscript).

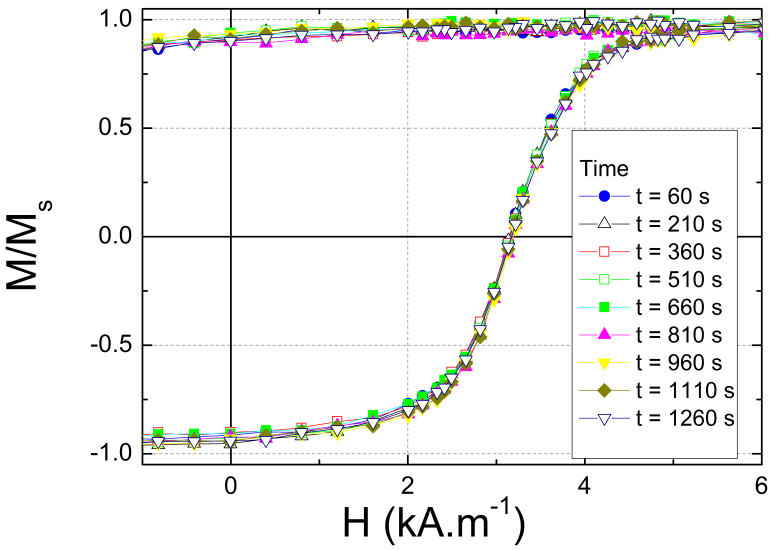

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Figure S 3. Time evolution under sample illumination of the M-H loops for the 10 nm FeGa sample at $\varphi = 0°$, zoomed in-between $H = -1$ kA.m^{-1} and 6 kA.m^{-1}

Figure S4 shows the time evolution of temperature changes probed at the sample surface when the material is illuminated by the laser. The illumination started at $t = 0$ s. The measurement was performed with an infrared thermometer.

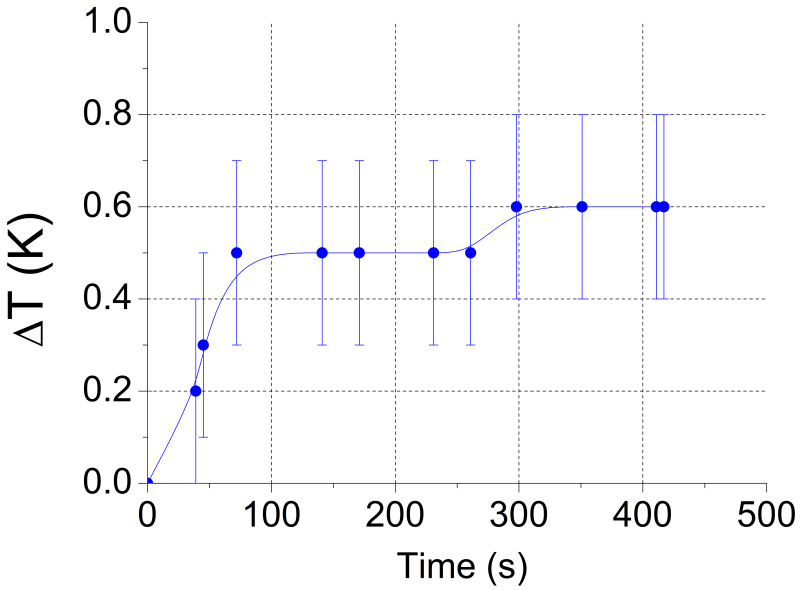

Figure S 4. Time evolution of temperature changes probed at the sample surface under laser illumination.

Figure S5 shows the time evolution of the temperature and of the resonance field for the 5 nm sample along $\varphi = 0°$. The LED illumination began at t=125s (i.e. LED ON) and finished at t=1836s (i.e. LED OFF).

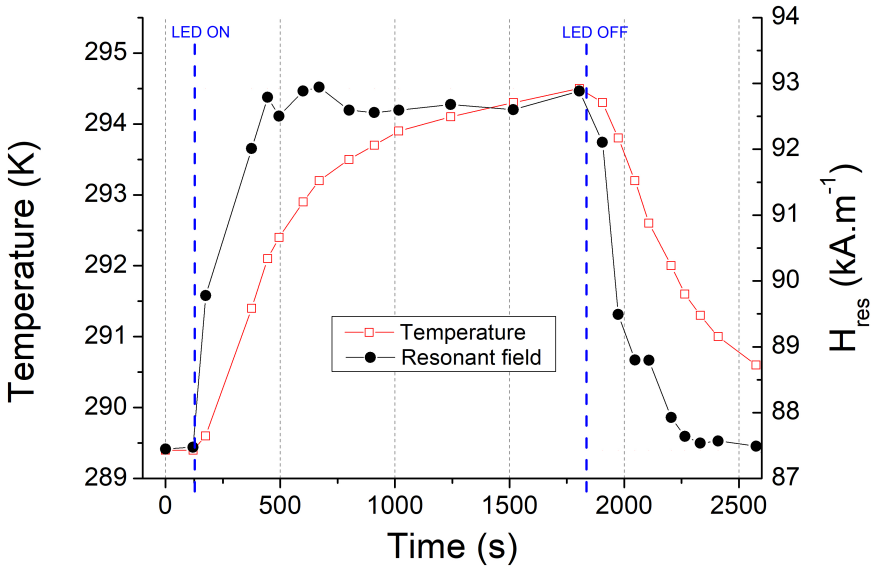

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Figure S 5. Time evolution of the temperature and of the resonance field for the 5 nm sample along $\varphi = 0°$.