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Non-thermal excitation and control of dynamic magnetization in a Fe/GaAs heterojunction by ultrafast laser pulses YU GONG, Physics & Astronomy, Hunter College and the Graduate Center of the City University of New York, A.R. KUTAYIAH, Z. CEVHER, Physics & Astronomy, Hunter College of the City University of New York, X.H. ZHANG, J.H. ZHAO, State Key Laboratory for Superlattices and Microstructures, Chinese Academy of Sciences, Y.H. REN, Physics & Astronomy, Hunter College and the Graduate Center of the City University of New York — Control carrier injection in metal semiconductor heterojunctions and therefore their magnetic dynamics is a major challenge in modern solid-state electronic devices. We report on our recent study of non-thermally excitation and coherently control the spin reorientation by utilizing low-energy femtosecond laser pulses to induce a photo- current through a Fe/GaAs interface. The magnetization dynamics and hysteresis curves were recorded by the pump-probe differential magnetic Kerr (DMK) technique. We show that magnetization excitation and reorientation strongly depend on the polarization of pump pulses. A clear four-fold switching is identified in DMK signal when we rotate the polarization of pump pulses. Our results show that the dynamic magnetization can be induced and controlled by ultrafast laser pulses, and therefore indicate the feasibility of next generation femtosecond-switching magnetic storage devices.

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