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New Method for Storing Information based on the Magnetic Permeability ALAN EDELSTEIN, JONATHAN PETRIE, KRISTOPHER WIELAND, RAYMOND MENCIA, US Army Research Laboratory, SY-HWANG LIOU, Physics Dept., University of Nebraska, GEORGE NEWBURGH, US Army Research Laboratory, CORY CRESS, Naval Research Lab, JOHN TIMMERWILKE, US Army Research Laboratory, SERGEI URAZHDIN, Dept. of Physics, Emory University — We present a new approach for storing information based on bits with different values for their magnetic permeability. Unlike present magnetic recording, information stored in this way should be ideal for archiving since it is unaffected by exposure to a magnetic field or moderate changes of temperature. Using heating with laser pulses as short as 100 μ sec, we have decreased the permeability of micron sized bits of an amorphous ferromagnet, Metglas, by crystallizing them. The permeability of micron sized bits of Cu/permalloy bilayers was decreased by using ohmic heating to cause the Cu to diffuse into the permalloy (80% Ni 20% Fe). This occurs because Ni is no longer ferromagnetic if the Ni atoms have too many Cu neighbors. The changes in the permeability are read by using either a magnetic tunnel junction or a spin transfer oscillator to measure whether the flux lines of a probe field are affected by the bits. The permeability of Cu/permalloy bilayers is not affected by 10 mega rads of gamma radiation from Co 60. Using heat assisted recording (HAMR) will permit writing permeability bits on a nm scale.

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