As the conventional magnetic recording technology enabled recording densities unforeseeable only a couple of years ago, there is a lot of effort put in developing new types of memory that could combine the nonvolatility, high speed and high density. Nonvolatility, the ability to function in an environment where the power cannot be guaranteed, along with capacity to withstand radiation does would destroy conventional memory are relevant properties for military and space applications. Magnetic random memory (MRAM) is the exponent of such efforts and is essentially a hybrid between an electronic RAM chip and a hard disk drive that uses magnetism to store the information but is a solid-state device. This talk summarizes our recent experimental and theoretical results obtained on the study of magnetization dynamics in magnetic nanostructured materials for information storage applications.

Magnetization dynamics is one of the key issues of magnetic materials that are part of new data storage devices. For two-dimensional (2D) devices used in MRAM, the magnetization dynamics is determined by the 2D magnetization switching properties as the MRAM cells require that the magnetic field be applied in the plane of the device. From switching studies one can determine the critical curve providing information about micromagnetic and structural properties. A new sensitive method for critical curve determination of 2D magnetic systems was proposed. This method, based on reversible susceptibility's singularities detection, is general and can be applied independent of the free energy expression describing the magnetic system under study. The method has been used to investigate the magnetization reversal of a wide range of systems that include magnetic nanostructured materials with different dimensionalities as nanoparticles arrays, thin films [1], and magnetic multilayers [2, 3].