# Investigation of dynamics of Permalloy-Molybdenum flakes by magneto-optical time-resolved spectroscopy

A. Demchenko, O. Kovalenko, V. Shokeen, Z. Raolison, G. Pourroy, J.-Y. Bigot

*Institut de Physique et Chimie des Matériaux de Strasbourg, UMR 7504, CNRS, Université de Strasbourg, BP 43, 23 rue du Loess, 67034 Strasbourg Cedex 02, France.*

We report on a study of the static and dynamic magnetic properties of Permalloy-Molybdenum (PyMb) flakes using magneto-optical time-resolved spectroscopy performed with femtosecond laser pulses. A detailed investigation of the spatial magnetization in the PyMb flakes has been performed using a magneto-optical Kerr microscope designed to provide simultaneously sub-micron spatial and ~100 femtoseconds temporal resolutions. The pump-probe configuration provides information on the demagnetization and re-magnetization times as well as on the local ferromagnetic resonance modes. It is found that the frequency $\omega_P$ and damping $\eta$ of the magnetization precession varies spatially from $\omega_P$ = 7-8 GHz and $\eta$=156-180 ps. We attribute this effect to a local change of the effective field associated to the shape and magneto-crystalline anisotropies due to the "leaf-like" shape of the flakes. Further work is under progress to investigate the presence of resonant modes associated to vortices.

This work has been carried out within the research program "Equipex UNION" financed by the Agence Nationale de la Recherche (ANR-10-EQPX-52).