The aim of this master thesis is to prepare and systematically characterize two groups of ultra-thin films of iron garnets with different compositions and deposition conditions. The first set consists of approximately 10 nm thick samples of gallium-doped yttrium-iron garnet on gadolinium gallium garnet ($Gd_3Ga_5O_{12}$) (GGG) substrates with different crystallographic orientations and different annealing temperatures. The second group contains gallium-bismuth-doped neodymium-iron garnet on GGG substrates. These samples have different thicknesses, the concentration of individual elements and different annealing temperatures. All samples were prepared by the metal-organic decomposition method.

The analysis of their physical properties was done by magneto-optical Kerr effect (MOKE) and optical experiments. Specifically, MOKE spectroscopy, Faraday hysteresis loops measurements and spectroscopic ellipsometry. Obtained experimental results were further used to deduce the spectral dependence of complete permittivity tensor. Its spectral dependence was than discussed with relation to the electronic structure of investigated materials which helped to select the best deposition conditions and substrate orientation.