

Instytut Fizyki Molekularnej Polskiej Akademii Nauk



Rozprawa doktorska

**DYNAMIKA NAMAGNESOWANIA
CIENKICH WARSTW GRANATU
ITROWO-ŻELAZOWEGO $Y_3Fe_5O_{12}$**

Adam Krysztofik

Promotor: prof. dr hab. Janusz Dubowik

Promotor pomocniczy: prof. UAM dr hab. Emerson Coy

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Abstract

Yttrium iron garnet ($\text{Y}_3\text{Fe}_5\text{O}_{12}$, YIG) is one of the compounds intensively investigated in terms of microwave and magnonic applications. This material is distinguished by its low damping of the magnetization precession enabling long-range propagation of spin waves. At the moment, it is predicted that information processing devices based on spin waves will have significantly lower energy consumption compared to those based solely on electronic transport. Potential applications are therefore the main motivation for the undertaken research.

This dissertation presents the results of research on structural and magnetic properties of thin yttrium iron garnet films. Particular attention was paid to the magnetization dynamics and its mutual relationship with the structural properties of the developed layers. The first chapters of this thesis present an introduction to ferromagnetic resonance, spin waves and theoretical basis of the employed research methods. The dissertation presents five publications that discuss the propagation characteristics of the surface spin waves and wave packets, the impact of epitaxial strain on the magnetization dynamics, as well as properties of epitaxial, structured and nanocrystalline YIG layers. The last chapter contains a summary and main conclusions from the obtained results.