Aalto University

Dissertation press release 5.11.2019

Active Magnetoplasmonics

Title of the dissertation	Magnetoplasmonics of ferromagnetic nanostructures
Contents of the dissertation	The dissertation provides a pathway to using plasmon resonances in ferromagnetic nanostructures for active tuning of magneto-optical responses, efficient loss compensation, and lasing. Magnetoplasmonics offers the possibility to design a large variety of systems where plasmonic and magnetic properties are intertwined. The work in the dissertation mainly focuses on the plasmonic and magneto-optical properties of two-dimensional nanoparticle arrays. Arrays of nickel-gold dimer nanostructures are used to study both near-field and far-field interactions between plasmonic and ferromagnetic nanodisks. The introduction of ferromagnic metals into plasmonic systems increases the optical losses. To mitigate losses, lasing in ferromagnetic arrays is demonstrated for the first time. The dissertation is motivated by the prospects of active and low-loss magnetoplasmonics, allowing for novel biosensing devices. In telecommunication systems, magneto-optically active and nonreciprocal plasmonic devices could replace bulky Faraday isolators and lead to the development of integrated optical modulators at visible and infrared wavelengths.
Field of the dissertation	Engineering Physics
Doctoral candidate	Sara Pourjamal, M.Sc.
Time of the defence	22.11.2019 at 12:00 noon.
Place of the defence	Aalto University School of Science, lecture hall TU1, Maarintie 8, Espoo
Opponent	Professor Gervasi Herranz, Institute for Materials Science of Barcelona, Spain
Custos	Professor Sebastiaan van Dijken, Aalto University School of Science, Department of Applied Physics
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