Investigation of Dna-Ferrofluid Interaction by Using Magneto-Optical Methods

Akyurekli, Mert (School: Al Ghubra School)

Nowadays, materials comprised of the combination of DNA and magnetic nanoparticles (MNPs) attract particular attention with regard to their design. The administration of these materials is extremely important for the development of nano-electronic, biomedical applications. Therefore it is very important to understand DNA-MNPs interaction properties. Aim of my project is to provide MNPs combine with DNA and, investigate magneto-optic properties (MOP) of the DNA-ferrofluid mixture. It is important to obtain stable and clear solutions with right pH value and without precipitation for optical measurement and applications. To prepare solution with these properties, produced high pH (around 13) magnetic liquid was mixed with the oleic acid and ethanol to balance the pH around 7. Afterwards, DNA was solved in the produced solution. The magnetic liquids with and without DNA was used to investigate MOPs. Magnetic field applied parallel and perpendicular to the optical path to measure transmission and linear dichroism properties. We also investigated the time dependence of these MOPs. Since both optical transmission and linear dichroism is related to interaction of MNPs in liquid they give useful information. In the case of magnetic liquid-DNA structure, DNA additon to the magnetic liquid increased the magnetic field dependent transmission but decreased linear dichroism. Finally, a basic and portable prototype is developed and matching results with the experimental setup were observed. Time dependent MOPs for the magnetic liquids containing with and without DNA were not researched before best to my knowledge. The homogenous DNA magnetic liquid structures obtained in this study supports the uniqueness and originality of the study as well.