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Characterisation of novel DNA nanostructures to investigate gene expression using atomic force microscope

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From a molecular view, a genome is made up of DNA which is several millions of monomers of nucleotides assembled into nanoscale dimensional structures to produce a specific amount of needed gene expression from RNA to protein under control of a high level of molecular recognition. The assembly of 3D DNA structures can be investigated with a high accuracy using atomic force microscopy (AFM). However, one of the main concern of AFM of DNA is to achieved a stable sample to produce high-resolution contrast of the DNA nanostructures for investigations.

The aim of this work is to introduce (DPPC) a zwitterionic lipid into the DNA sample to obtain an optimal sample that will facilitate free diffusion of DNA on the mica surface for high-resolution AFM imaging. Using linear DNA and circular plasmid we developed a model of DNA-DPPC complexes in orde to change the current practice of AFM-DNA. The phenomena we consider is a well-defined critical micel concentration of DPPC with a net charge at the head group consisting of negative phosphate and positive choline, this molecule exhibit an absolute flexibilty to decorate the surface of the DNA and enhaned diffusion on the mica surface, another advantage of this molecule is the fact that the molecule are biocompatible to tolorate the salinity in a manner that does not affect the conformation of the DNA structures.

A systematic approach of varying drying time, different rinsing volumes and methods was investigated using linear DNA and circular plasmid in the presence of DPPC and divalent cations. The outcome reveal an enhance binding with high-resolution images of linear DNA on mica, while irregularity was observed in a circular plasmid.

Biography

Grema Kassim Amin has completed his MSc in Bio-nanotechnology at the age of 34 years from University of Leeds School of Chemical and process Engineering in collaboration with University of Sheffield nanofolio program. Following his completion of MSc he got an offer of PhD. At the University of Sheffield to study Biofuel from Algae, the research will involve the understanding of biology of algae and their growing medium which include nanotoxicology of their media. He is a Scientific officer at one of the leading research institute known as National Agency for Science and Engineering Infrastructure, under the Federal ministry of Science and Technology, Ngeria. He is a member of Nanofolio and nanomedicine society of Nigeria, and Royal Microscopical society/ European microscopic society in UK.

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