P029 PDNA as redox building blocks for membrane guided self-assemblies

<u>Denis Pompon</u> and Aude Laisne
CGM-CNRS Avenue de la Terrasse, 91190 Gif-sur-Yvette

Different semi-synthetic PDNAs, which encompass a protein core engineered from cytochrome b5 scaffold, an embedded tuneable redox cofactor, a synthetic linker and a large oligonucleotide were designed, synthesized and purified to homogeneity. These building blocks can be reversibly attached to Ni-DOGS-doped natural or supported membranes through a metal chelate with the protein part and be polymerized on a fully controllable manner (number and sequential order of units) using a solid phase synthesis strategy and a stepwise addition of suitable complementary oligonucleotides. The resulting structures could recreate a large range of regular distribution of patterned redox and absorbing centers separated by fully tuneable distances. Depending on the distance setting, different types of electron transfer or energy transfer chains can be reconstituted with a large expected range of electro-optic properties. Dynamic characterisation of building block self-assembly was performed using surface plasmon resonance imagery and fluorescence-based approaches. Spatial organization of the polymer can be potentially adjusted by playing with the support membrane shape (planar v.s. spherical) and through modulation of the DNA strand curvature upon binding with additional DNA binding protein. These highly modular structures featuring very large aspect ratios and tuneable redox and optical properties open potential development routes for a large number of applications ranging from single molecule detection to molecular biocomputing.