Artificial DNA membrane pores

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Abstract

Membrane nanopores are essential components of biological and artificial cells. Our group has shown that we can create artificial nanopores using DNA origami self-assembly[1,2] and anchor them in lipid membranes[3].
Insertion of negatively charged DNA pores into a hydrophobic membrane was achieved by attaching functional hydrophobic groups in strategic positions on the DNA nanopores. Pore formation in lipid vesicles was studied for different nanopore designs and hydrophobic modifications via fluorescent imaging[4]. We demonstrated membrane anchoring using only two porphyrin-based lipid anchors. The porphyrin moieties also act as fluorescent dyes to aid the microscopic visualization of the DNA nanopore[3]. Single-channel current recordings of our artificial DNA nanopores are performed using a high-throughput lipid nanobilayer system that has recently been introduced by our group[5,6]. Pore architecture and functionality of our DNA nanopores can be easily adapted, opening the pathway to design novel membrane channels.

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