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Detergent interaction with tethered bilayer lipid membranes for protein reconstitution MATTEO BROCCIO, HAW ZAN GOH, MATHIAS LOESCHE, Carnegie Mellon University — Tethered bilayer lipid membranes (tBLMs) are self-assembled biomimetic structures in which the membrane is separated from a solid substrate by a nm-thick hydrated submembrane space. These model systems are being used in binding studies of peripheral proteins and exotoxins. Here we aim at their application for the reconstitution of water-insoluble integral membrane proteins. As an alternative to fusion of preformed proteoliposomes we study the direct reconstitution of such proteins for applications in biosensing and pharmaceutical screening. For reconstitution, highly insulating tBLMs ($R \sim 10^5 - 10^6 \Omega$) were temporarily incubated with a detergent to screen for conditions that keep the detergent-saturated membranestable and ready to incorporate detergent-solubilized proteins. We assess the electrical characteristics, i.e. specific resistance and capacitance, by means of electrochemical impedance spectroscopy (EIS) under timed incubation with decylmaltoside and dodecylmaltoside detergents in a regime around their critical micelle concentration, 1.8 mM and 0.17 mM respectively and demonstrate the restoration of the tBLM upon detergent removal. Thereby a range of concentration and incubation times was identified, that represents optimal conditions for the subsequent membrane protein reconstitution.

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