Fluorinated Surfactants for Membrane Protein Extraction

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Surfactants carrying either fully or partially fluorinated alkyl chains are conventionally thought to be poor solubilisers of lipids and membrane proteins because of their lipophobicity. New fluorinated surfactants of different headgroups have been developed. We show that these compounds could substitute detergents' function without much interference with membrane proteins' functionality. Their self-assembly and solubilising properties were studied by the use of isothermal titration calorimetry (ITC), dynamic light scattering (DLS), and gel electrophoresis (SDS-PAGE). Micellisation was found to be mainly driven by entropy, and the critical micellar concentration (CMC) decreased with increasing hydrocarbon chain length. Notably, some of these surfactants solubilise lipid vesicles at room temperature and extract important membrane proteins directly from *Escherichia coli* membranes. Our findings demonstrated promising, mild detergent activity for maltose-based fluorinated surfactants in membrane-protein extraction and applications compared to the lactose-based compounds.

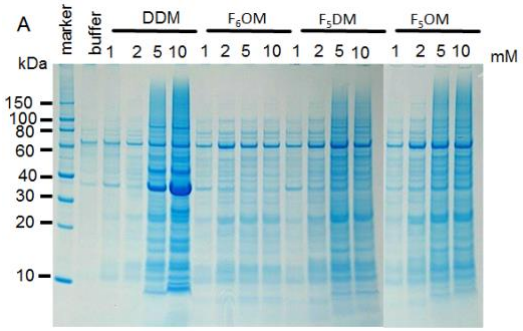

Fig. 1: SDS-PAGE of *E. coli* membrane extracts upon exposure to various FSs with micellar concentrations as indicated

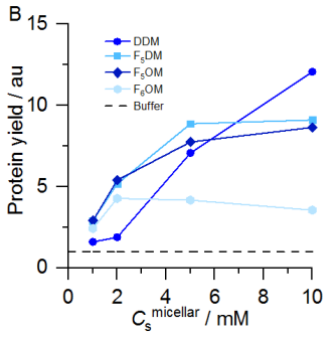

Fig. 2: Graphical representation of *protein*-extraction yields (symbols) when using surfactant relative to the yield obtained when no surfactant was added (i.e., only buffer; *dashed line*)

References

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[2] Frotscher, E.; Danielczak, B.; Vargas, C.; Meister, A.; Durand, G.; Keller, S., A Fluorinated Detergent for Membrane-Protein Applications. *Angew. Chem. Int. Ed.* **2015,** *54*, 5069-5073.