

# Lipidic cubic phase for hosting enzymes and improving their catalytic activity

V. Grippo

*Faculty of Chemistry, University of Warsaw*

Lipid cubic phase systems are excellent immobilizing carriers for enzymes due to their biocompatibility and well-defined pore nanostructure<sup>1</sup>. They have been proposed as a convenient matrix for incorporating enzymes and holding them on the electrode surfaces in fully active forms. Biofuel cells based on cubic phase do not need additional separating membranes and can be easily miniaturized. The lipidic membrane is stable in the presence of water<sup>2</sup>.

Advantages are multiple when hosting anodic and cathodic enzymes. If bilirubin oxidase from *Myrothecium verrucaria* (MvBOd) is included in the mesophase the stability of the biocathode is improved<sup>3</sup>. When *Corynascus thermophilus* cellobiose dehydrogenase (CtCDH) is trapped in the monoolein cubic phase, not only stability but also catalytic performance are enhanced both for mediated and direct electron transfer conditions<sup>4</sup>. Ruthenium ammonium chloride, Ru(NH<sub>3</sub>)Cl<sub>2</sub>, with formal potential at pH 7.4 equal to -136 mV, was successfully used the mediator.

(1)Sun, W.; Vallooran, J. J.; Mezzenga, R., *Langmuir*, **2015**, *31*, 4558–4565.

(2)Nazaruk, E.; Szlęzak, M.; Górecka, E.; Bilewicz, R.; Osornio, Y. M.; Uebelhart, P.; Landau, E. M., *Langmuir*, **2014**, *30*, 1383–1390.

(3)Grippo, V.; Pawłowska, J.; Biernat, J.; Bilewicz, R., *Electroanalysis*, **2017**, *29*, 103-109.

(4) Grippo V., Ma S., Ludwig R., Gorton L., Bilewicz R., *Bioelectrochemistry*, **2017**, DOI 10.1016/j.bioelechem.2017.10.003