Recovery and purification of mannosylerythritol lipids (MELs) using aqueous two-phase extraction

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Introduction and background

- MELs are extracellular glycolipid biosurfactants.

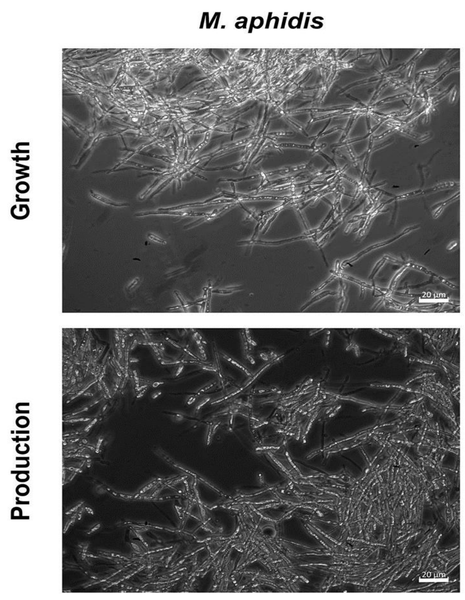
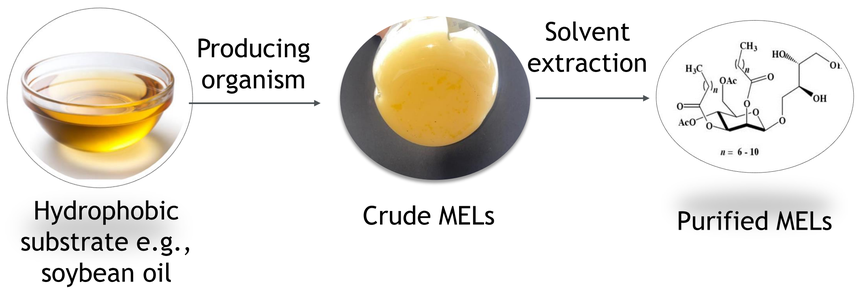


Figure 1: Microscopic images of one of the MEL producing organisms- Pseudozyma aphidis during production and growth (Beck & Zibek, 2020)



Producing organisms: ***Pseudozyma sp*, *Ustilago sp*.**
Substrates: Hydrophobic e.g. soybean oil-High fermentation yields (165g/L), Low product purity, hydrophilic e.g. sucrose, lower fermentation
Downstream processing Technique : Solvent extraction, foam fractionation, chromatography
Challenges: large volumes of organic solvents required, low recoveries, environmental impact and biocompatibility

Applications of MELs:

Skin and hair care formulations-ceramide-like moisturizing activity

drug delivery, antimicrobial and anticancer activity

Emulsifiers and stabilizers in food processing

Detergency

Recovery using ATPE

- ATPE leverages the biphasic behaviour of two immiscible aqueous phases formed by different polymers, salts, or combinations thereof, for the partitioning of solutes based on their hydrophobicity, charge and molecular weight.
- Successfully demonstrated for the recovery of biomolecules such as proteins and enzymes and rhamnolipid biosurfactant.

Advantages:

- Mild operating conditions (more than 80% water),
- High selectivity and recovery,
- Ease of scaleup,
- Reduced environmental impact.

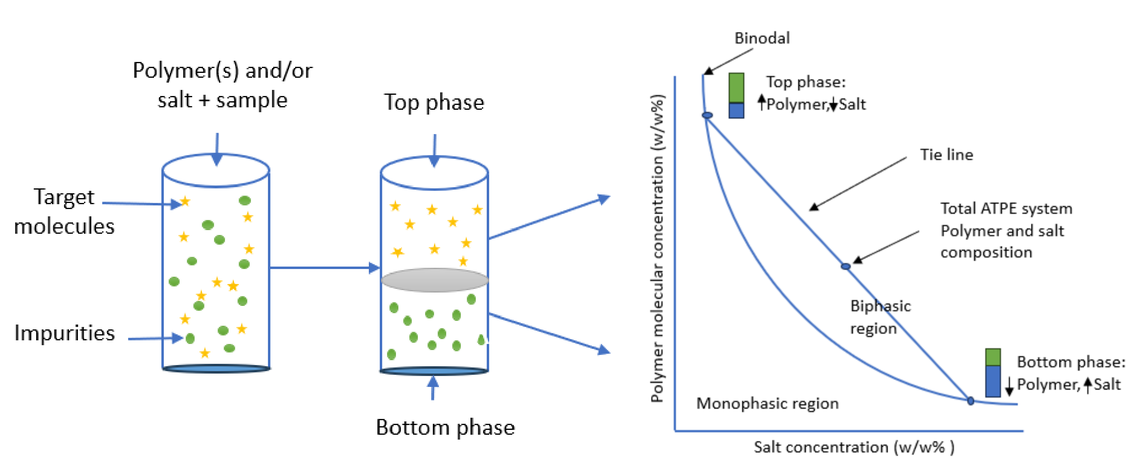
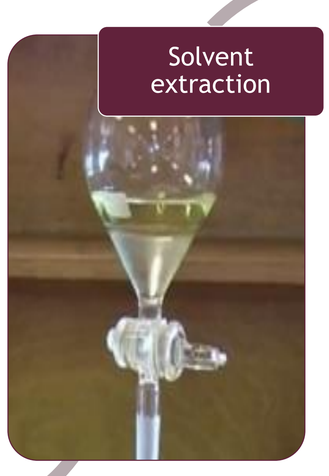


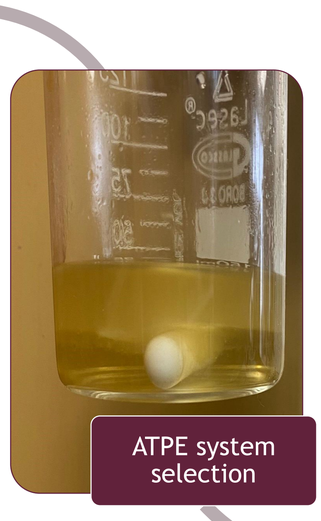
Figure 2: Schematic diagram of ATPE and a generic phase diagram representing the phase behavior of the phase forming components.

Methodologies

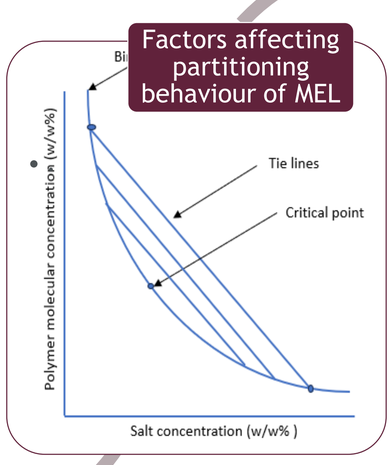
Production of MELs

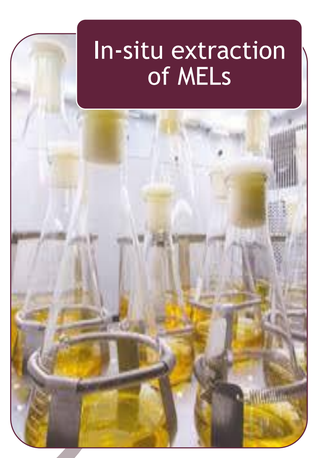


Solvent extraction



ATPE system selection





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