

Self-assembled systems generated from bio-based materials: Functions and potential applications of biosurfactants

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Biosurfactants (BS) are functional amphiphilic compounds produced by a variety of microorganisms. They show unique properties compared to chemically synthesized surfactants, such as mild production conditions, higher biocompatibility, and multifunctionality, and thus have been receiving increasing attention. Among biosurfactants, glycolipid BS are the most promising because they are efficiently manufactured by microbial processes.

Mannosylerythritol lipids (MELs), which are glycolipid BS bearing mannose and erythritol as hydrophilic head groups, are produced from vegetable oils by *Pseudozyma* yeasts at yields of over 100 g/L. MELs exhibit excellent interfacial and self-assembling properties leading to the formation of different lyotropic liquid crystals such as sponge, cubic, and lamellar phases. They also show versatile biological properties including antitumor and cell differentiation activities toward different mammalian cells.

In addition, MEL-A, the major component of the yeast products, exhibits high binding affinity toward different immunoglobulins such as IgG, IgA, and IgM. More significantly, cationic liposomes including MEL-A dramatically increase the efficiency of gene transfection into various mammalian cells via membrane fusion. MELs have thus great potentials for novel advanced biomaterials in various industrial fields.