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TURBISCAN: Accelerating Formulation Success for Lipid Nanoparticles (LNP)

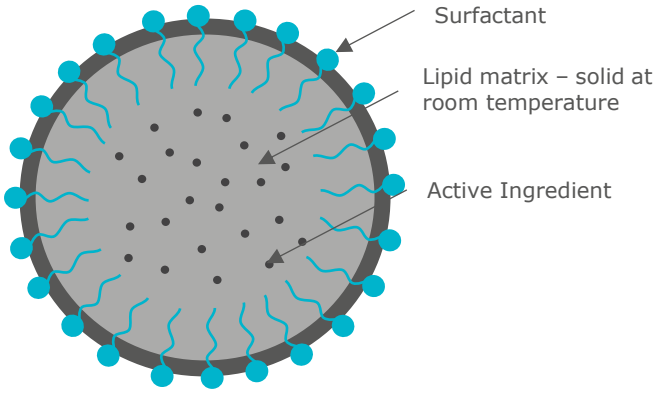
CONTEXT

The development of efficient drug delivery systems remains a key challenge in the pharmaceutical, nutraceutical, and cosmetic industries. **Solid Lipid Nanoparticles** (SLN or LNP) present a promising carrier platform, combining high biocompatibility, protection against drug degradation, and tunable release kinetics. However, current formulation evaluation and optimization processes are hampered by the complexity of dispersion behaviours, scale-up challenges, and the need for rapid, quantitative, and non-destructive assessment methods. Accelerating LNP development and screening requires techniques that can simultaneously provide insight into particle formation, stability, aggregation, and drug loading efficacy with minimal manual intervention.

SOLID LIPID NANOPARTICLES

Lipid Nanoparticles (LNP) are advanced delivery carriers, can be seen as lipid nano-droplets solidified, developed to overcome stability and efficacy limitations of conventional emulsions. Their unique structure and properties provide key benefits:

- Easier redispersion by limit physical destabilization by promoting agglomeration instead of coalescence and minimizing Ostwald ripening due to lipid solidification.
- Active protection: the solid lipid core offers effective protection of encapsulated lipophilic drugs against oxidation.
- Targeting: LNP allow for functionalization with target-specific ligands, making them suitable for applications such as targeted therapy.



However, formulating stable LNP dispersions remains challenging due to the need for high-energy production methods or solvents, the