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Micellar to cubic transition in phytanthriol based nanoparticles

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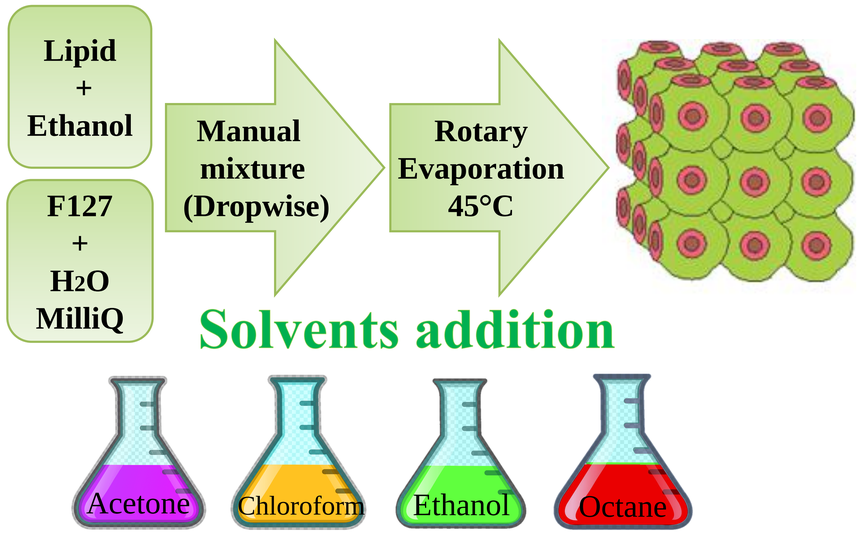
laboratory of BIOSYSTEMS

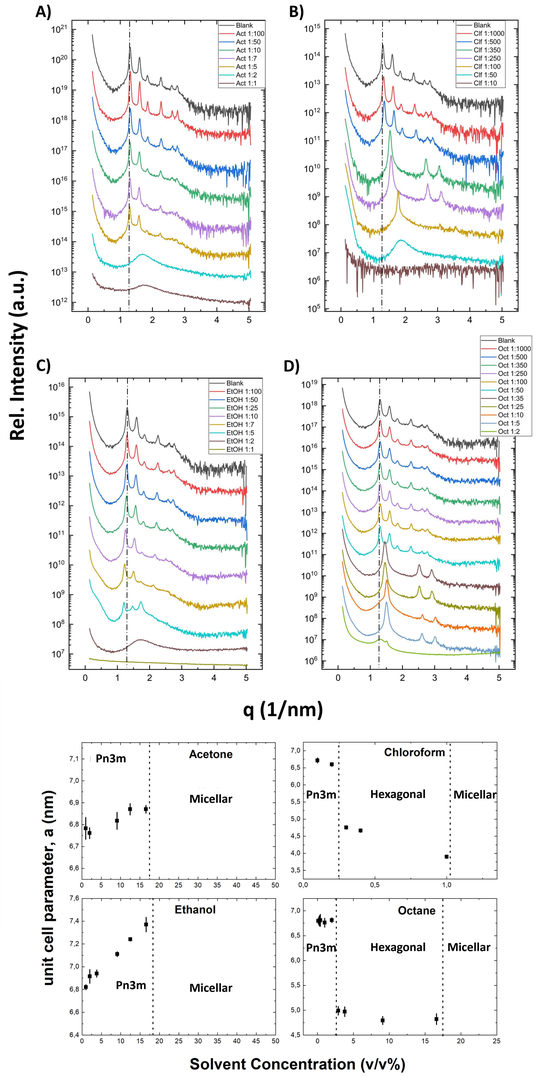
Abstract

Cubosomes are composed of a mixture of specific lipids with the ability to self-associate, such as phytanthriol (PHY), and polymers that act as a stabilizer, such as poloxamer (F127). These nanoparticles have a high hydrophobic volume, approximately 50%, which makes them promising vehicles for drug delivery of hydrophobic molecules. A challenge for incorporating molecules into nanoparticles is the use of organic solvents in the process. In this study, we investigated the structural influence of four different solvents (acetone, ethanol, chloroform and octane), using low-angle X-ray scattering and cryogenic electron microscopy techniques, aiming to help choose the most appropriate solvent to charge the drug in the cubosome.

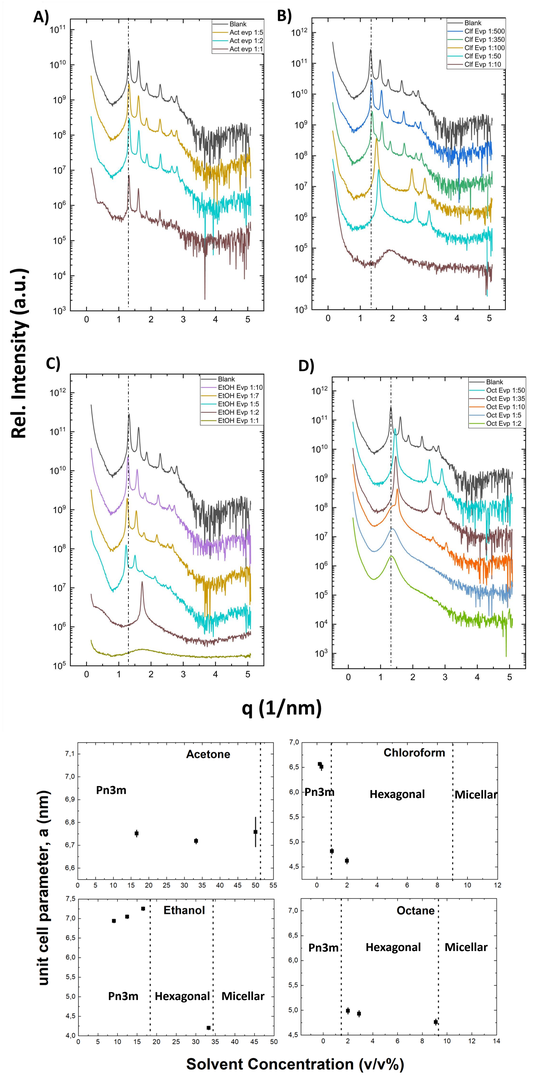
Methods



Time 0h



Time 24h



Conclusions

- **High amount of acetone and ethanol (< 17 % v/v) are not able to change the inner cubic structure.**
- **The unit cell parameter didn't significantly change in the presence of acetone, whereas it increases 10 - 15% in the presence of ethanol.**
- **Chloroform and Octane have different effect over PHU-CUB induced a cubic-to-hexagonal-to-micellar transition.**
- **Researchers should try to use less harmful solvents in order to produce or to incorporate hydrophobic drugs into cubosomes.**
- **After the 24-hour incubation period, the influence of solvents are partially reversible.**

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LNLS

LNNano Laboratório Nacional de Nanotecnologia

ICB USP