

Effect of spray drying on the structural modifications of casein micelles loaded with Aloe vera extracted anthraquinones



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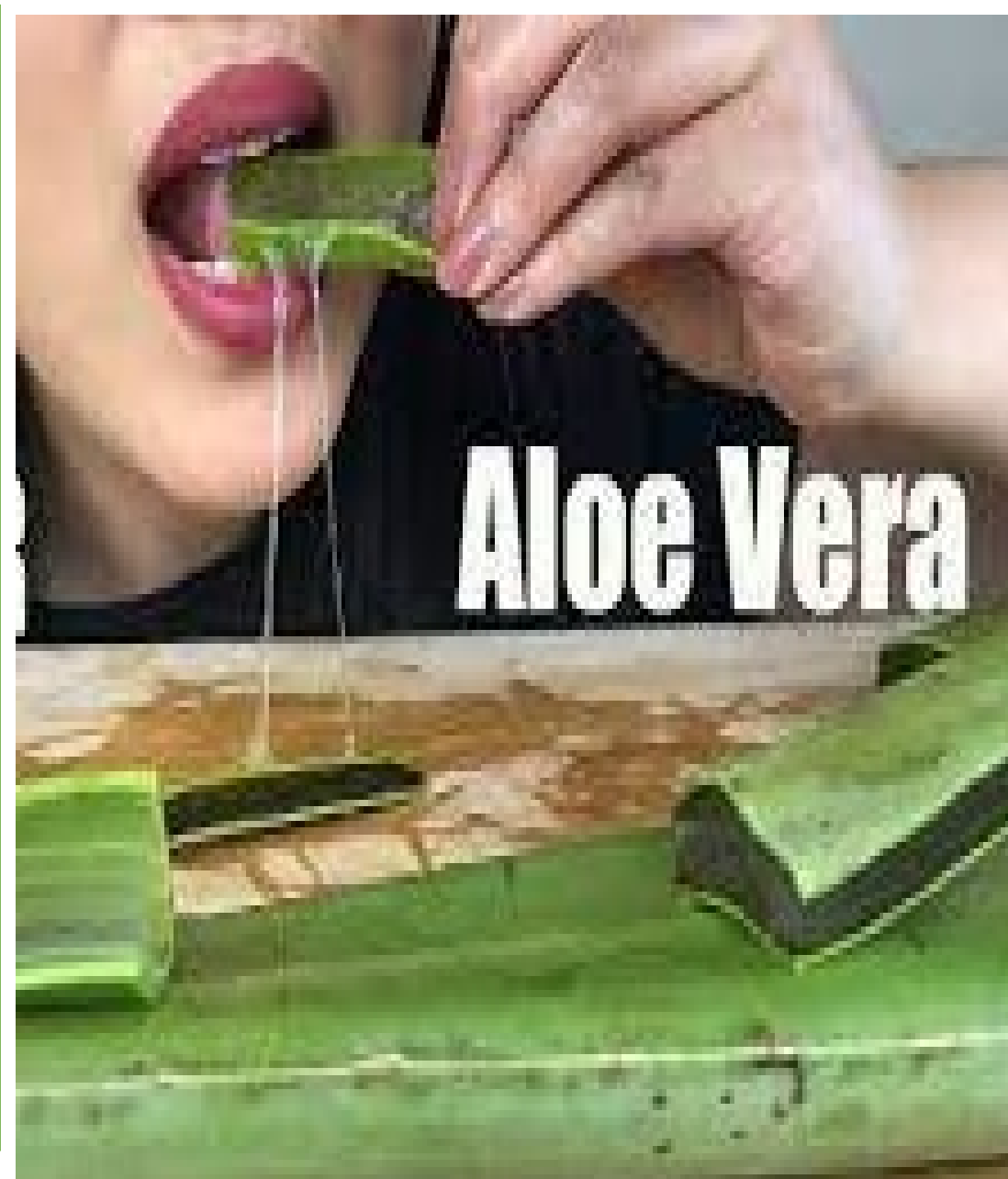
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Introduction

Aloe vera is a rich source of anthraquinones, which exhibit diverse biological activities. However, anthraquinones are highly sensitive to food processing conditions and tend to develop off-flavors and unpleasant odors. Consequently, their incorporation into food systems is limited. To address this issue, the utilization of a wall material for encapsulation is necessary.



Casein Micelles

Casein micelles exhibit unique structural and physicochemical properties, making them an excellent choice for encapsulating anthraquinones.

They possess:

- ✓ Self assembling properties
- ✓ GRAS
- ✓ Readily available
- ✓ Less expensive
- ✓ With their hydrophilic and hydrophobic domains, they offer an ideal delivery system for anthraquinones.



The food and nutraceutical industries widely employ spray drying due to the numerous advantages it offers, including:

- ✓ Preservation of bioactive compounds
- ✓ Enhanced stability and shelf life
- ✓ Improved solubility and dispersibility
- ✓ Ease of formulation and customization
- ✓ Convenience and versatility
- ✓ Cost-effective production

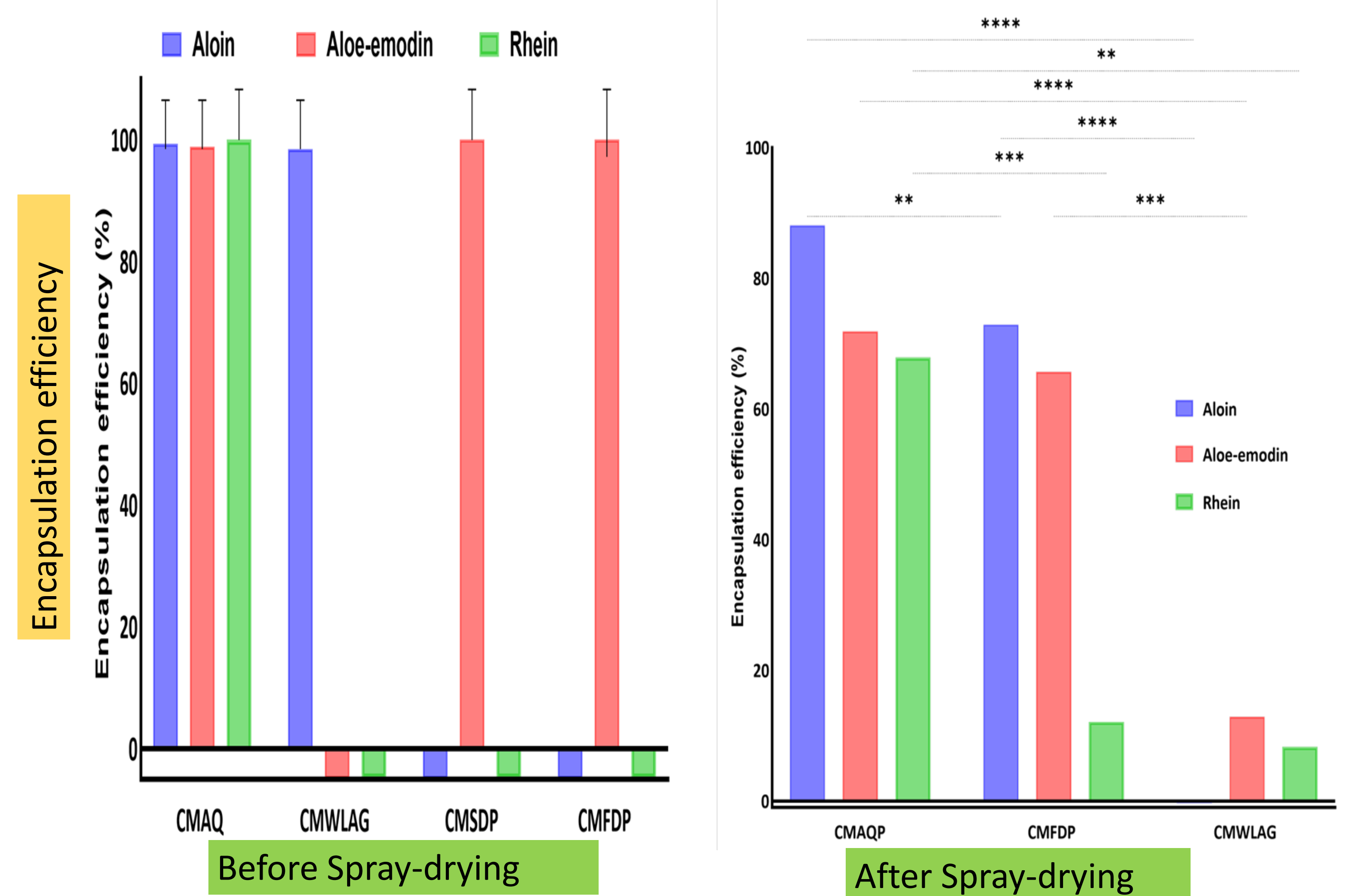
Aim

- ❖ Improve the shelf life and storage stability of encapsulated materials by producing microcapsules through spray drying of liquid nano capsules.
- ❖ Assess the effectiveness of casein micelles in encapsulating desired substances by evaluating their encapsulation efficiency.
- ❖ Ensure the stability and preservation of anthraquinones encapsulated within casein micelles after the spray-drying process, maintaining their desired properties.
- ❖ Gain insights into the physical properties and behaviour of casein micelles by assessing their secondary structural characteristics.

Method

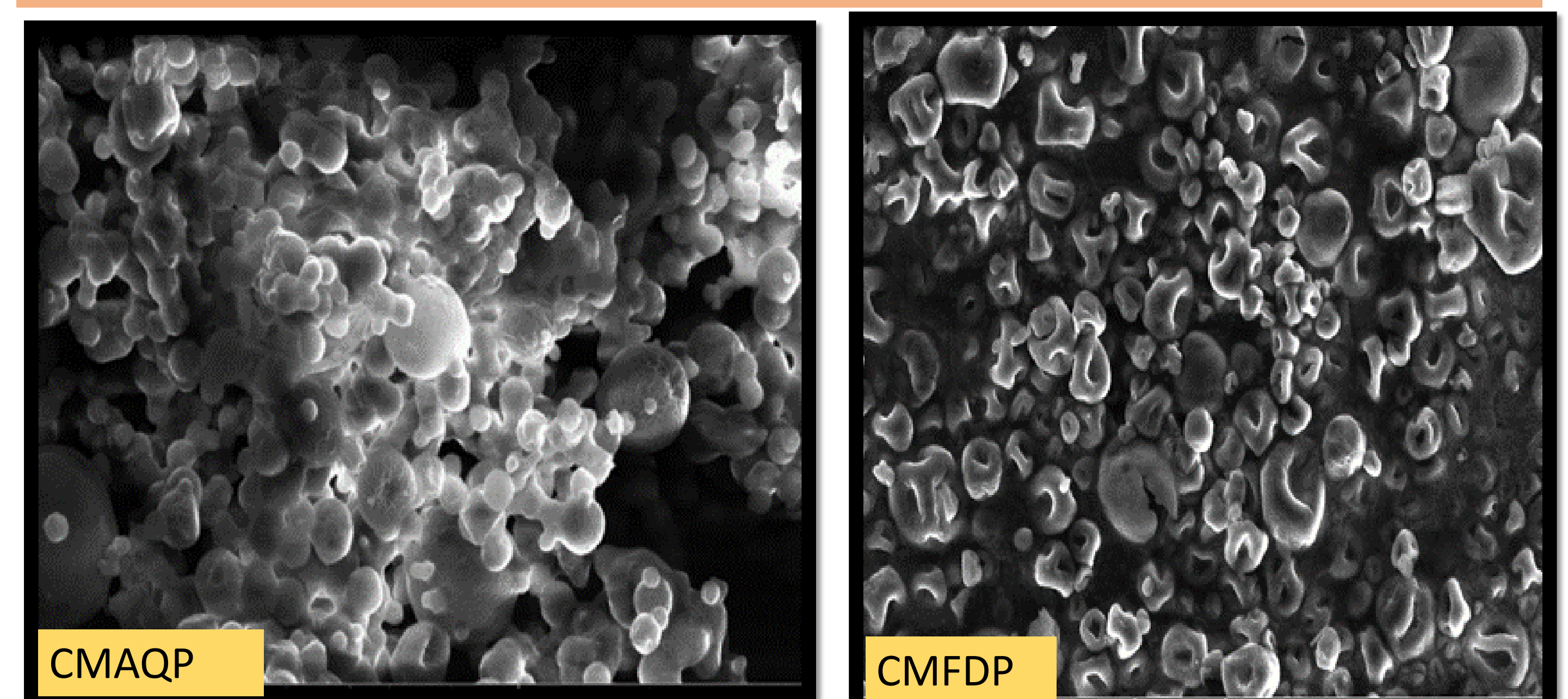


Results

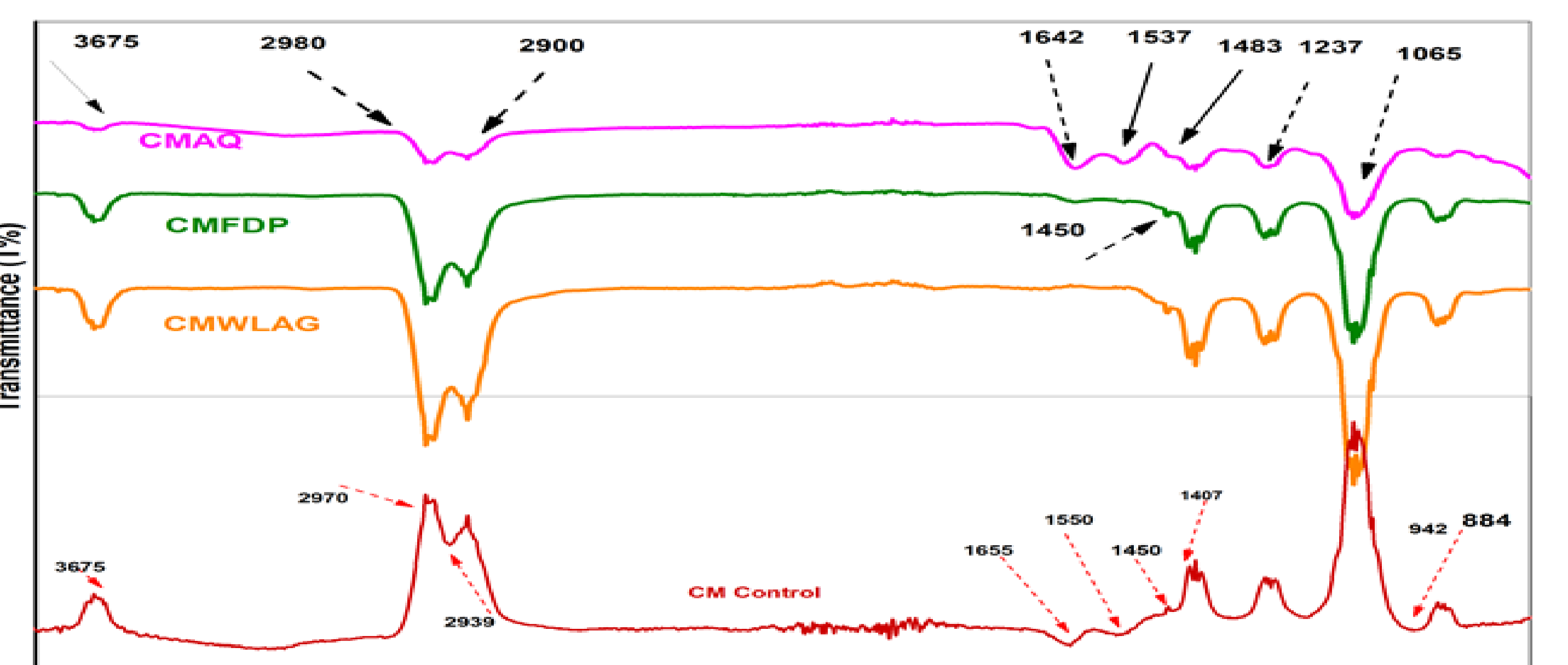


- ✓ Comparing the pre-spray drying results, a reduction in the encapsulation efficiency of anthraquinones (aloin) is observed, with a decrease from 99% to 88%.
- ✓ CMAQP possess highest encapsulation efficiency

SEM Images



FTIR Spectra



Analysis using SEM images and FTIR spectra confirms that the secondary structure of casein micelles remains unchanged after the spray-drying process.

Conclusion

- ✓ Despite a decrease in encapsulation efficiencies following spray drying, a sufficient amount of anthraquinones are still effectively encapsulated within casein micelles, making them bioavailable to the body.
- ✓ The secondary structure of casein micelles remained unchanged in CMAQP after spray-drying, suggesting the therapeutic effectiveness and functional properties of spray-dried anthraquinone-loaded casein micelles.
- ✓ Thus, the results suggest that spray drying is a viable method for encapsulating anthraquinones into casein micelles.