

Abstract

Nanoemulsion-Based Dressing: FTIR Spectroscopic Characterization [†]

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Introduction: Fourier-transform infrared spectroscopy (FTIR) is a key technique in the characterization of biomaterials, allowing the identification of functional groups and the verification of bioactive compound incorporation in nanostructured systems. In this study, the spectral signature of raw materials used in the formulation of a nanoemulsion with curcumin, sunflower oil, annatto oil, and Cremophor applied in the production of a dressing consisting of a natural latex biomembrane (*Hevea brasiliensis*) was evaluated. **Methodology:** FTIR spectra were obtained from isolated raw materials (curcumin, vegetable oils, and Cremophor) and from the curcumin-containing nanoemulsion formulation, aiming to compare their spectral profiles and identify possible chemical interactions. **Results:** Curcumin showed characteristic bands around 3328–3508 cm^{−1} (−OH), 1637 cm^{−1} (C=O and conjugated C=C), and 1505 cm^{−1} (aromatic ring), confirming its polyphenolic structure. Sunflower oil exhibited an intense peak at 1744 cm^{−1} (ester carbonyl), associated with its triglyceride composition, while annatto oil showed a band at 1633 cm^{−1} (conjugated C=O), indicative of bixin and carotenoids. Cremophor presented peaks at 3460 cm^{−1} (−OH) and 1726 cm^{−1} (C=O), typical of ethoxylated surfactants. In the curcumin-containing nanoemulsion, the Cremophor spectral profile predominated, but new bands between 1511 and 1637 cm^{−1}, associated with curcumin, confirmed its incorporation into the matrix. **Conclusion:** The FTIR results confirmed the preservation of the spectral signatures of the raw materials and the successful integration of curcumin into the nanoemulsion, reinforcing its potential for application in biomaterial-based dressings.



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