Characterization of Microencapsulated Benzoyl Peroxide (E-BPO) for the Treatment of Papulopustular Rosacea

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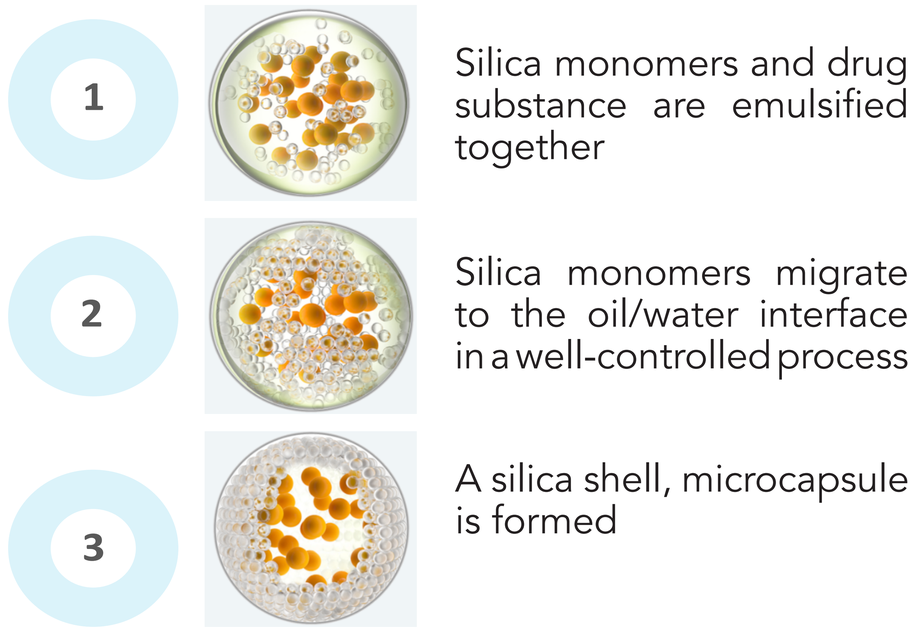
Introduction & Objectives:

- Development of effective delivery vehicles is very important for optimizing outcomes in patients using topical therapies and multiple stud-ies have demonstrated that drug formulations can strongly influence efficacy, safety, and adherence.[1-3]
- Benzoyl peroxide (BPO) has been used for the treatment of rosacea, but has only modest efficacy and often results in intolerable stinging and burning.[4-6]
- Developing a BPO product with an improved efficacy and tolerability has been challenging. Sol gel technology has been used to develop a microencapsulated formulation of BPO (E-BPO) for the treatment of rosacea that overcomes the limitations of the free drug.

Materials & Methods:

- Sol-gel microencapsulation is a process whereby amorphous silica form a shell by forming interconnections among colloidal particles (the "sol") under increasing viscosity until a silica shell (the "gel") is formed (**Figure 1**).
- The active ingredient in its solid form serves as the core during the sol-gel reaction forming core-shell microencapsulated active ingredients, such as BPO.
- The structure of the E-BPO micro-capsules was demonstrated using scanning electron microscopy (SEM) and cryo-SEM.
- The surface was measured by Brunauer, Emmett and Teller (BET); energy dispersive spectroscopy (EDS) analysis was also carried out.

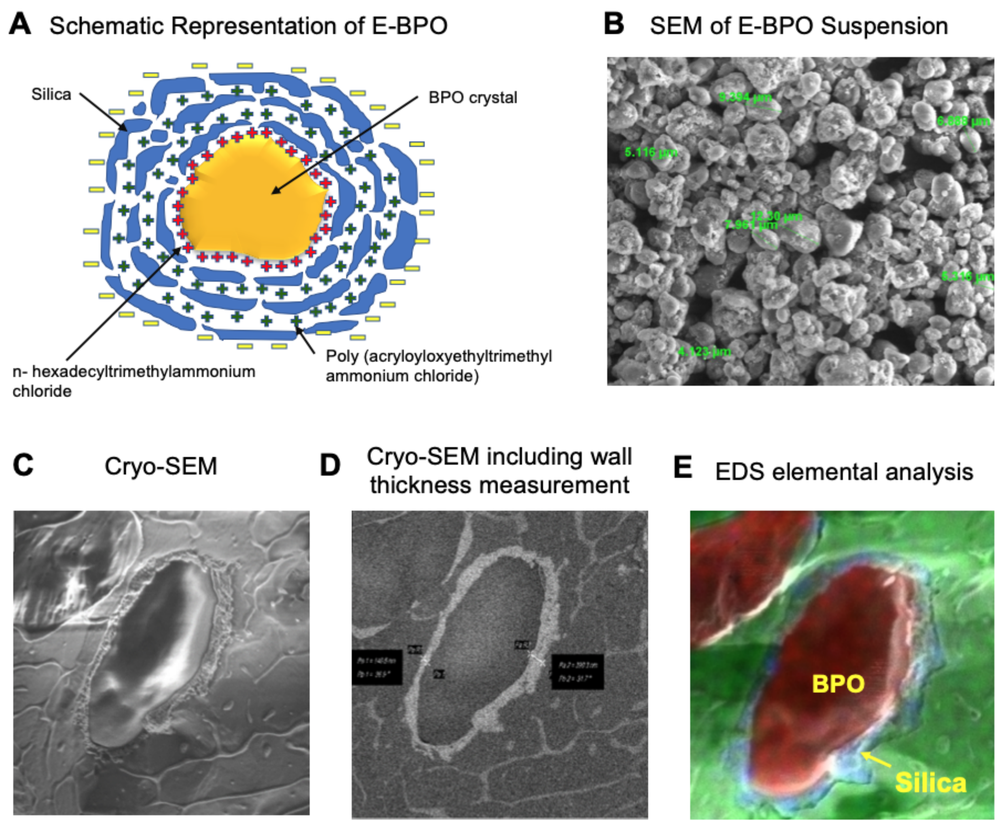
Figure 1: The three-step Sol-gel Process



Results:

- E-BPO microcapsules characterized by SEM were <30 µm in diameter, with the majority being <10 µm (**Figure 2**).
- Cryo-SEM analysis also showed that the majority of microcapsules were <10 µm and that the surface of each microcapsule was highly porous.
- The thickness of the shell ranged from approximately 40 to approximately 411 nm. EDS demonstrated that the microcapsules were predominantly composed of a carbon core, corresponding to BPO; and an outer shell that contained predominantly silicon corresponding to the silica shell.
- Results from two phase 3 studies of E-BPO Cream, 5% in patients with papulopustular rosacea showed that this formulation significantly improved outcomes and was well tolerated with few patients reporting application site dryness, scaling, pruritus stinging or burning; and no reports of severe stinging or burning post baseline.

Figure 2: E-BPO microcapsules: (A) E-BPO schematic (B) SEM of E-BPO suspension (C) Cryo-SEM image (D) Cryo-SEM image including size measurement of wall thickness (E) EDS elemental analysis



CONCLUSION

The manufacturing process for E-BPO produces generally <10 µm microcapsules consisting of a core of BPO and a porous silica shell. Phase 3 results from patients with rosacea treated with this product indicated that it was efficacious and well tolerated, supporting further development of this delivery process in rosacea and other dermal applications.

References

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