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**Modeling the solidification of O/W-emulsion droplet in solvent evaporation technique**

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**Highlights**

- Proposed a new method to numerically study the solidification of a droplet
- Developed a novel numerical method to capture the shrinkage of the droplet correctly
- Provided a deep insight into the details of mass transfer during this process
- Revealed several factors influencing this process from micro-scale point of view

**Abstract**

The removal of organic solvent plays an important role in the fabrication of polymer spheres by emulsion-based solvent evaporation technique. Mathematical model describing the mass transfer of fluorobenzene (FB) inside the O/W emulsion droplet, from the droplet to the continuous phase and from the continuous phase to the atmosphere to produce millimeter-sized polystyrene (PS) spheres was established. A novel approach based on finite volume method was developed to numerically solve the mathematical equations concerning the shrinkage of the solidifying droplet. Using this method, the variations of the droplet size and the concentration field inside the droplet were captured. The details of the solidification process which cannot be obtained

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