Structured polymeric microparticles via aerosol cationic photopolymerization

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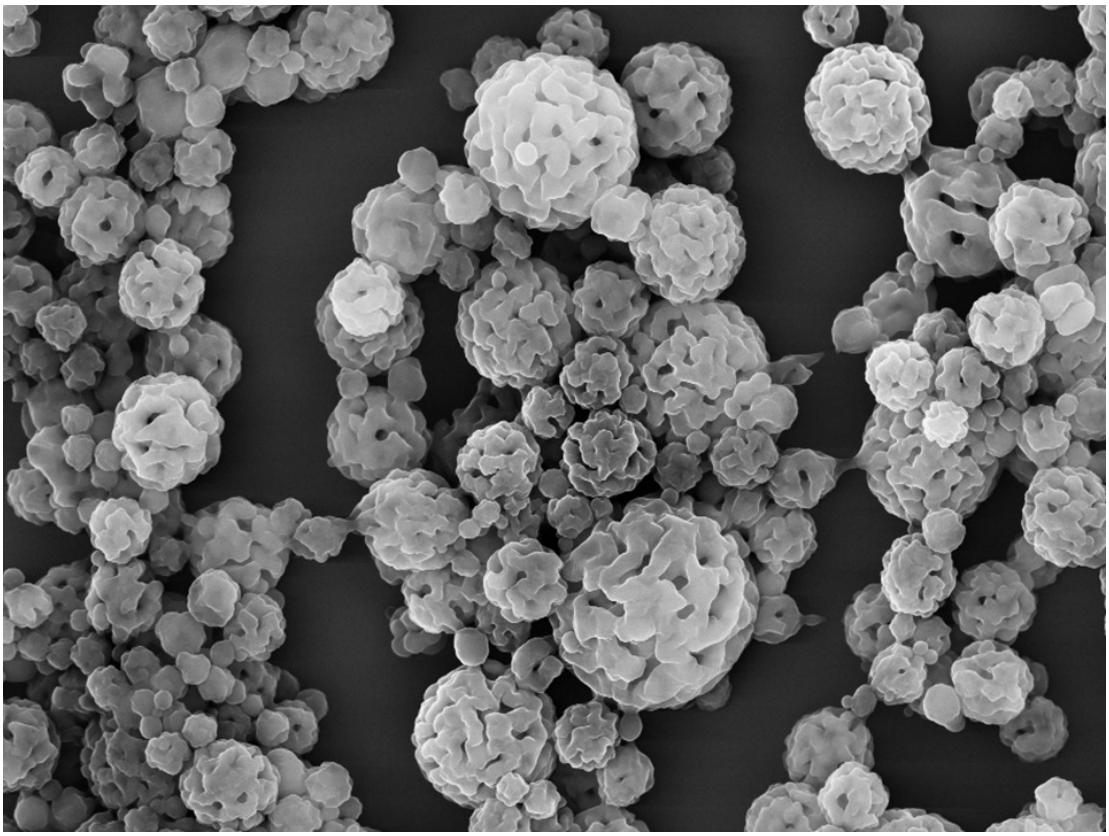
**ABSTRACT BODY:**
**Abstract:** Production of polymeric microparticles has gone through an exponential development in the last decades. In particular, the creation of particles with non-full structures is interesting in many applications from medicine to environmental treatments. Still, there are some issues related to the use of those techniques, such as emulsion polymerization, that need a burdensome purification in the downstream processes. In our studies we tried to develop a continuous polymerization process that gives us the possibility to obtain dry structured microparticles using neither surfactants nor a liquid medium.

This technique was based on an aerosol photo-induced polymerization. A solution containing the reacting monomer dissolved in a mixture of solvents is sprayed and exposed to UV-light. During the reactor passage, both reaction and phase separation occurred inside the single droplet. By adjusting the amounts and ratios of the solvents it was possible to obtain different structures. Porous particles with various tunable pore shapes and dimensions were obtained. Capsules were obtained with the addition of a co-solvent able to participate with the reaction, delaying the gelation of the structure and, thus, allowing the creation of a polymeric shell in the outer layers of the reacting droplet. As to the applications, we encapsulated an active ingredient within our particles, both porous and core-shell. The active ingredient was curcumin, an anti-inflammatory and anti-oxidant compound. We found that the addition of the active ingredient did not affect the microparticles synthesis; furthermore, the release kinetics investigation showed a slower release in case of porous particles, compared to capsules. However, porous particles were able to release the total amount of curcumin, while capsules released a lower fraction of the active ingredient.



Porous particles obtained by photo-induced polymerization of a divinylether