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A novel method for preparation of silica-based nano double emulsions

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Drug delivery system has property of encapsulating both hydrophilic and hydrophobic in double emulsion system (e.g. w/o/w) contents are of great interest for scientists. In our study, we have proposed the formation of such a system in the form of double emulsion at nano scale. Reaching such a small level can lead to loss of encapsulation efficiency of system. Herein we proposed a new technology that reinforces the inner water droplet with silica shell, resulting in the improvement of the encapsulation efficiency. Firstly, primary w/o emulsion is prepared by ultra-sonication and its characterization and optimization for size distribution and dispersity index is done to select the best candidate for making the double emulsions. Then, double emulsion at macro-scale is obtained by mechanical mixing and at nano-scale by spontaneous emulsification. A morphological study by optical microscopy is done to visualize the double structure at micro scale. Encapsulation efficiency and stability against severe temperature conditions has been analyzed and proved that system having silica are much more effective regarding encapsulation as compared to control. Morphological studies by transmission electron microscopy are done to visualize appearance of the nano double emulsion droplets. Then, encapsulation studies proved that systems having certain amount of silica are more protective as compared to control even at nano scale. Finally, release studies proved that system can release almost all of encapsulated materials at 37 °C.

Biography

Salman Akram is a Post doctoral fellow currently pursuing his career in Unistra located in France.

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