

# A Review: Recent Advances in Microencapsulation Technology for Controlled Drug Delivery Systems

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**Abstract:** *Controlled drug delivery technology is a rapidly advancing field, integrating knowledge from various disciplines to improve therapeutic outcomes. Microencapsulation plays a vital role in this technology by converting liquids into solids, modifying colloidal and surface-active properties, offering environmental protection, enhancing bioavailability, and controlling drug release. Microcapsules, typically spherical particles ranging from 50 nm to 2 mm, enclose a core material within a polymer coating, protecting the active substance and allowing precise release control. The morphology of microcapsules is primarily influenced by the core material and the method of shell deposition. The primary drug release mechanisms from microcapsules include diffusion, dissolution, osmosis, and erosion. Microencapsulation techniques can be broadly classified into chemical and mechanical (or physical) processes, each tailored to optimize drug release profiles. This review discusses the latest advancements in microencapsulation technologies and their applications in controlled drug delivery systems.*

**Keywords:** Controlled drug delivery, Microencapsulation, Drug release mechanisms, Bioavailability, Polymer coating, Core material, Diffusion, Dissolution, Osmosis, Erosion, Chemical processes, Mechanical processes