

Hydrogel-Based Drug Delivery Systems

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Hydrogels, with their distinctive three-dimensional networks of hydrophilic polymers, drive innovations across various biomedical applications. The ability of hydrogels to absorb and retain significant volumes of water, coupled with their structural integrity and responsiveness to environmental stimuli, renders them ideal for drug delivery, tissue engineering, and wound healing.

This review delves into the classification of hydrogels based on cross-linking methods, providing insights into their synthesis, properties, and applications.

We further discuss the recent advancements in hydrogel-based drug delivery systems, including oral, injectable, topical, and ocular approaches, highlighting their significance in enhancing therapeutic outcomes. Additionally, we address the challenges faced in the clinical translation of hydrogels and propose future directions for leveraging their potential in personalized medicine and regenerative healthcare solutions.

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