latest technology of combination of CM chitoan tech, gold nano, gulucosamine in various fields.

The latest technology combining carboxymethyl chitosan (CM-chitosan), gold nanoparticles (AuNPs), and glucosamine revolves primarily around biomedical and pharmaceutical applications, particularly in targeted drug delivery, cancer therapy, and tissue regeneration.

Nanocomposite Drug Delivery

Recent advances show CM-chitosan provides a biocompatible, biodegradable matrix for stabilizing gold nanoparticles, which confer photothermal properties and enhanced targeting capabilities in cancer treatments. For example, chitosan-Au nanocomposites have been used to deliver potent anticancer agents like curcumin and 6-mercaptopurine with improved efficacy, reduced toxicity, and controlled release, partly due to the pH-responsive behavior and enhanced cellular uptake enabled by the CM-chitosan coating. The gold nanoparticles also allow photothermal therapy, where localized heating induced by light improves cancer cell killing.[1]

Glucosamine Integration

Glucosamine, a fundamental building block of chitosan, is intrinsically present in the polymer structure. Its supplementation via CM-chitosan composites supports tissue repair and anti-inflammatory effects, making such composites promising for osteoarthritis and wound healing. The combined effects of glucosamine's biological roles and the nanostructure's drug delivery performance amplify regenerative outcomes for cartilage and related tissues.[2] [1]

Multifunctional Nanostructures

Technologies have incorporated these hybrids into hydrogels and nanoparticle systems capable of targeted delivery, sustained release, and stimuli responsiveness (temperature, pH). Moreover, recent research integrates aptamers or other targeting molecules with CM-chitosan-gold nanocomposites to enhance selectivity, for example, in pathogen detection or cancer cell targeting, improving diagnostic and therapeutic precision.[3] [4]

Summary

The synergy of CM-chitosan, gold nanoparticles, and glucosamine in current technologies focuses on creating multifunctional nanocomposites for cancer therapy with combined chemo-photothermal effects, advanced wound healing formulations benefiting from anti-inflammatory properties, and targeted, sustained drug delivery platforms using stimuli-sensitive hydrogels. These composite materials represent a frontier in personalized medicine and regenerative biotechnology as of 2025.[1] [3] [2]

This overview synthesizes the state-of-the-art combination technologies for CM-chitosan, gold nanoparticles, and glucosamine across biomedical applications.

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1. https://pmc.ncbi.nlm.nih.gov/articles/PMC11124311/
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3. https://www.frontiersin.org/journals/materials/articles/10.3389/fmats.2025.1588627/epub
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