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Antibiotic Aminoglycoside Hydrogels

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Invention Description

Hydrogels are useful in many applications including tissue engineering, regenerative medicine, cell culturing, wound healing and biosensors. Hydrogels with antibacterial properties have even greater utility; however, complicated multistep fabrication processes and the cost of raw materials limit their use.

Aminoglycosides are a class of small-molecule antibiotics that consist of two or more aminosugars joined by a glycosidic linkage to a hexose nucleus. They are clinically useful in treating various infections because of their ability to interfere with protein synthesis in microorganisms.

Researchers at Arizona State University have utilized antibiotic aminoglycosides to create a novel class of antibacterial hydrogels. These new hydrogels are non-adhesive and anti-fouling and can be used in active, on-site, real time situations. Moreover, they are easy to synthesize, consisting of just two components. These hydrogels also create non-adhesive substrates that can be used for development of multicellular spheroids/organoids constructed of various cell lines which are useful in drug screening, drug design and toxicity assessments.

These aminoglycoside-based hydrogels with their diversity of applications, cost-effectiveness and ease of synthesis present an opportunity to satisfy a wide range of unmet clinical and research needs.

Potential Applications

- Wound healing/bandages
- Regenerative medicine
- 3D cell culture substrates
 - 3D cancer cell spheroids/organoids – for studying drug delivery and drug resistance in HTP screening
- Medical device/surgical instrument coatings
- Long term antifouling surfaces
- Biosensors

Benefits and Advantages

- Ease of synthesis – only two components
 - Particularly advantageous in active on-site applications
- Active against various clinically relevant bacterium
- Low cellular toxicity & immunogenicity
- Rapid synthesis & reusability for multicellular spheroid/organoid generation
- Cost effective