



INFECTION-RESPONSIVE THERANOSTIC SYSTEM FOR PREVENTING AND MONITORING WOUND & SURGICAL SITE INFECTIONS

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OBJECTIVE

Stimuli-responsive DDS for wound and surgical site infections

SOLUTION

Biopolymeric sponges as antibiotic-loaded dressing system

Advancements in Wound & Surgical Site Dressing

Conventional Dressing Limitations:
poor air permeability, limited exudate absorption, and lack of wound healing promotion



Antibacterial Hydrogels

Promotes healing & hemostasis

Advantages: ↑ water content, soft gel state, & improved skin tissue affinity

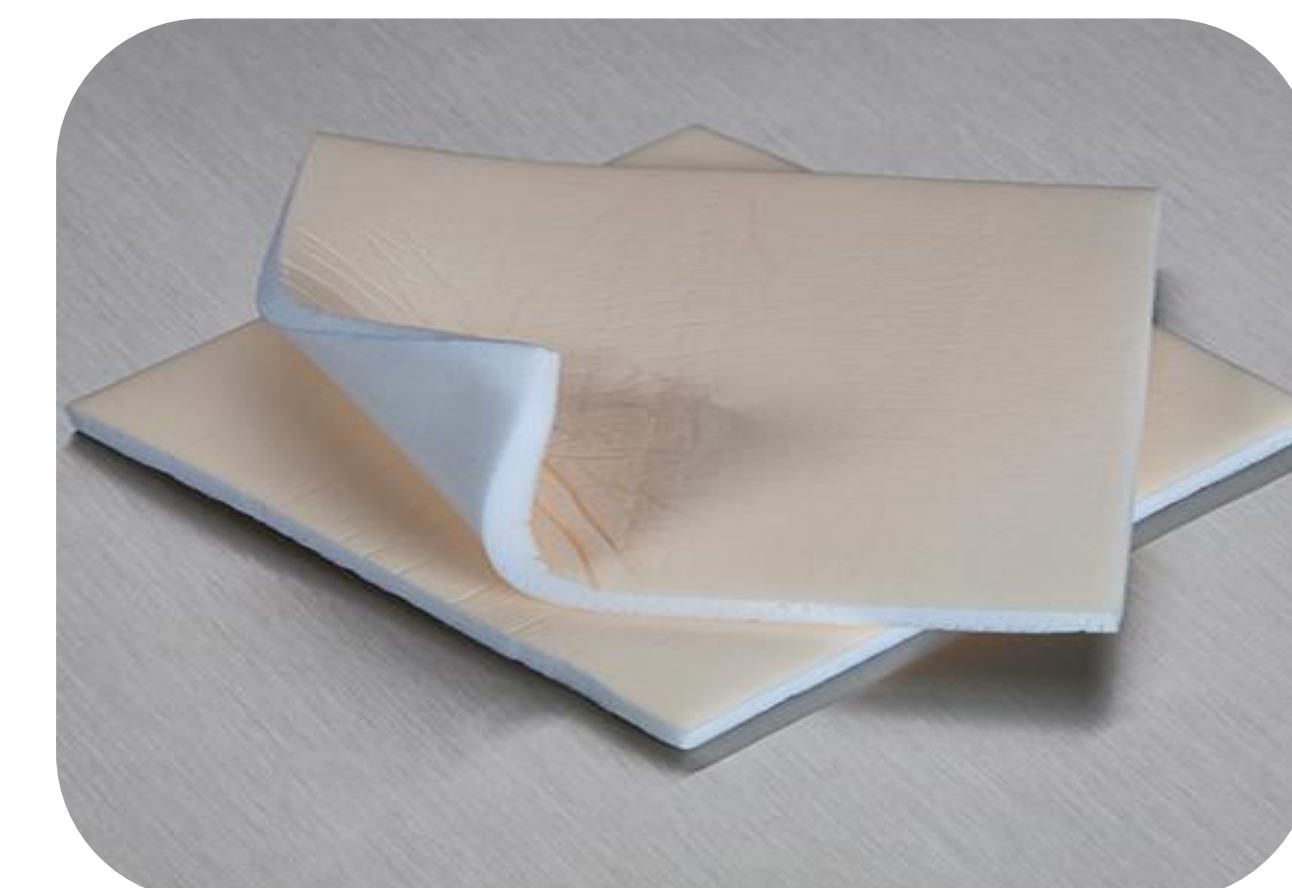
Drawbacks: ↓ air permeability, ↑ transportation costs



Antibacterial Sponges

Retains hydrogel properties, ↑ exudate absorption capacity

Advantages: lightweight, better air permeability



Issues with Passive DDS: cytotoxicity with physical loading and restricted effects with covalent loading of the drug

Advantages of Smart DDS:

Infection cues act as triggers for drug release, ↑ local drug conc., and reduced systemic side effects

5–20%

of all patients undergoing surgery develop an SSI*



*Real data are even higher

SSI increases the length of stay in hospitals by

7.5 DAYS

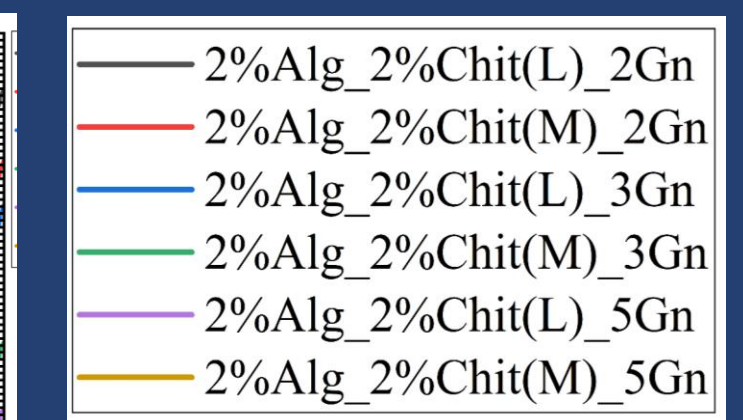
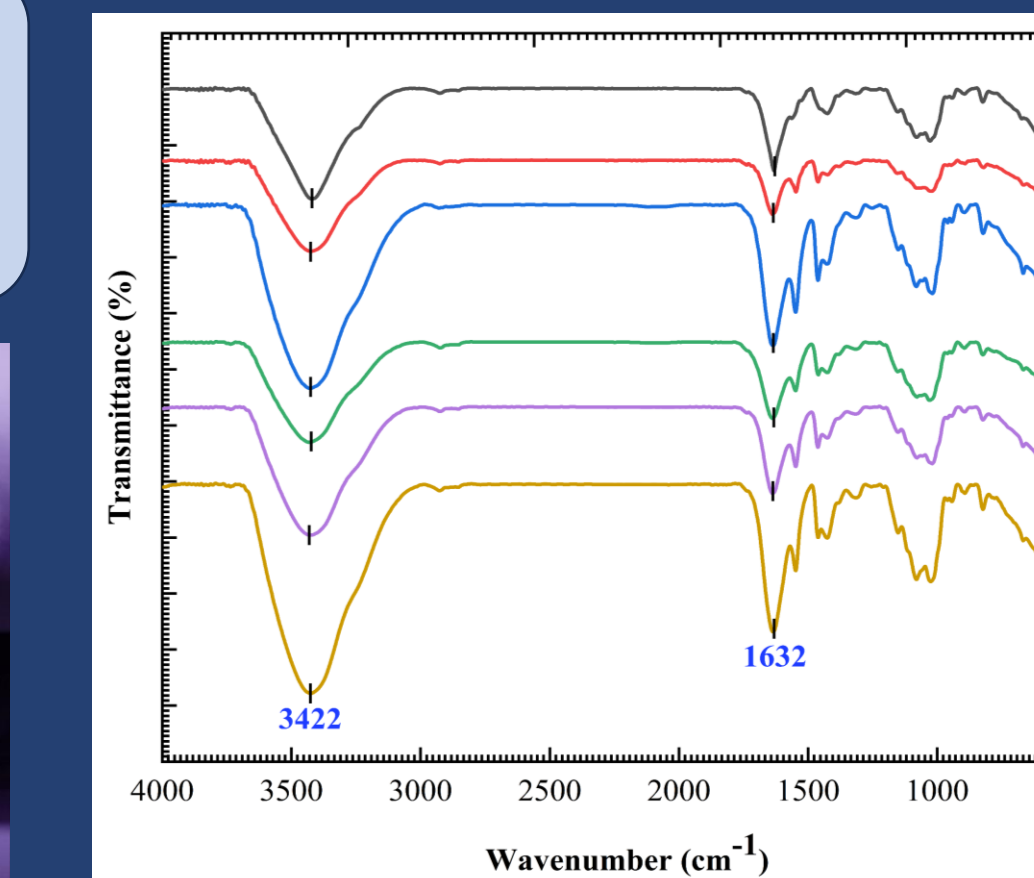


For hospitals, infections lead to

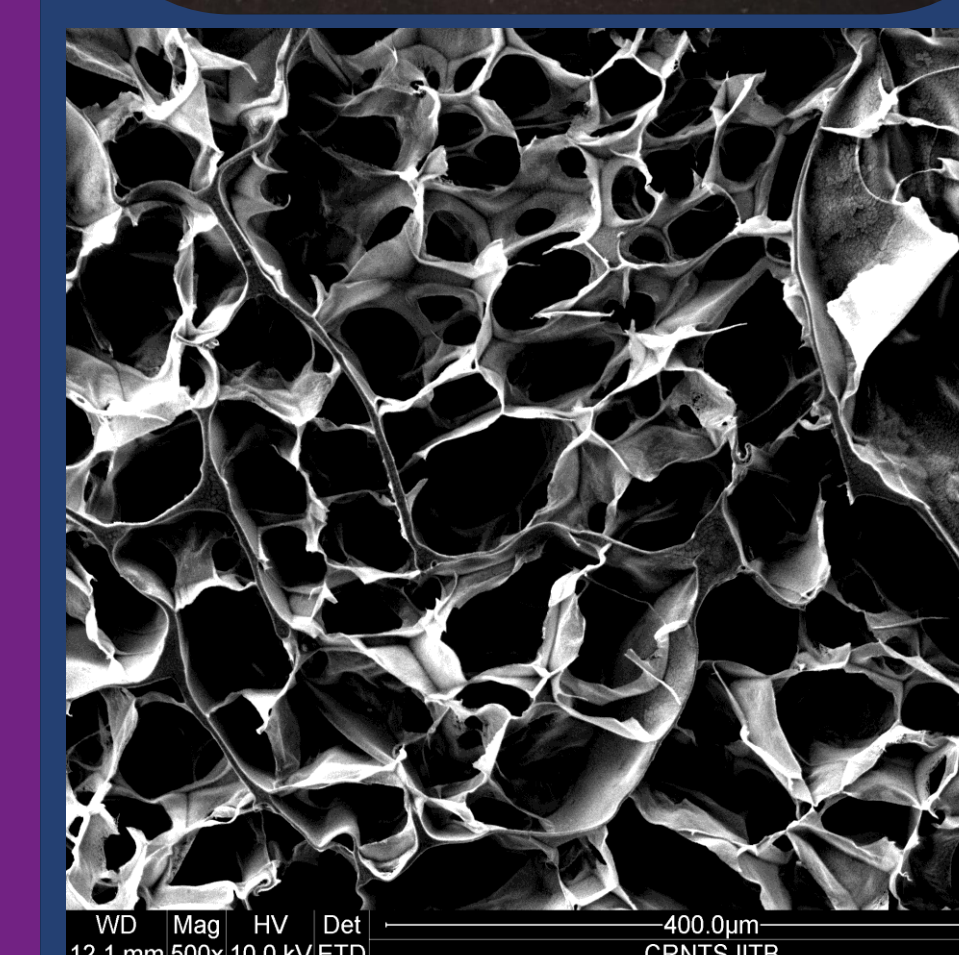
ADDITIONAL COSTS

SSI treatment costs are 2.9 times higher than standard treatments

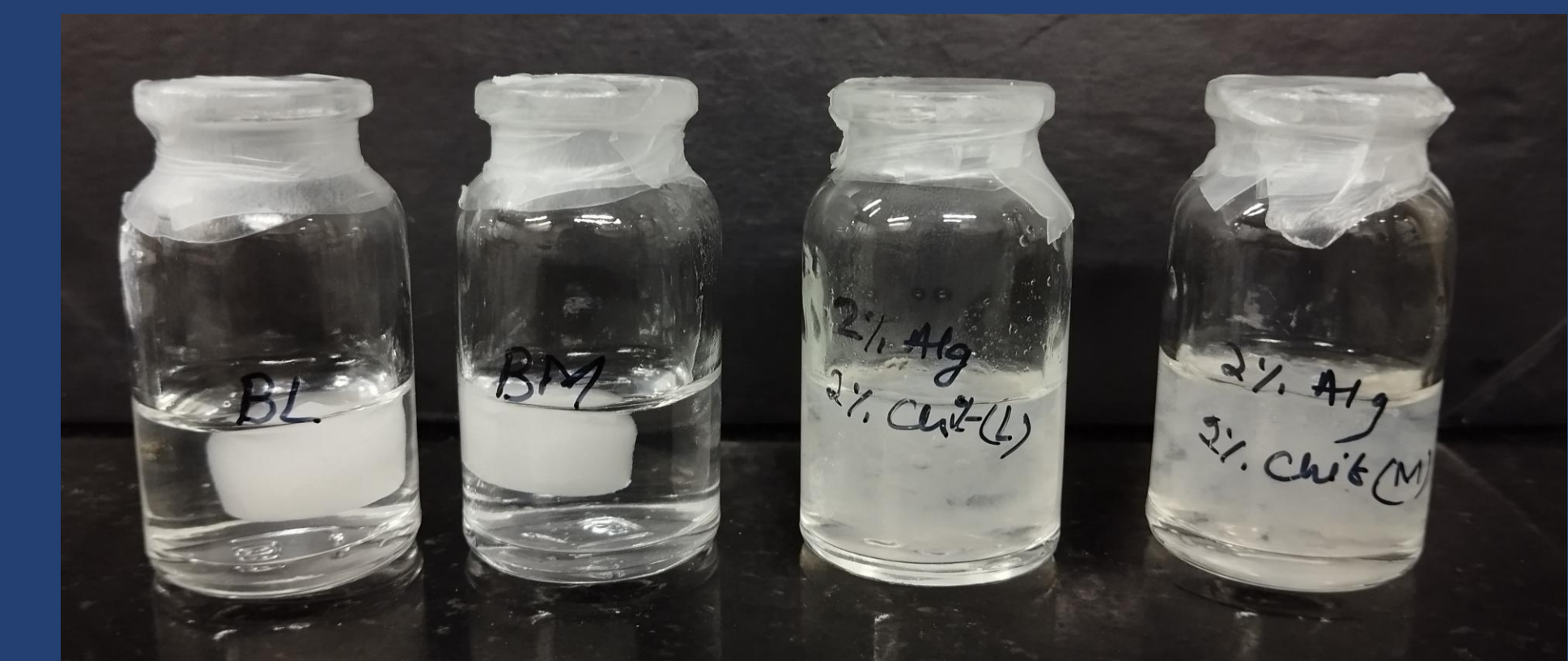
Characterizations



FTIR spectra of sponges: Characteristic peaks of both biopolymers

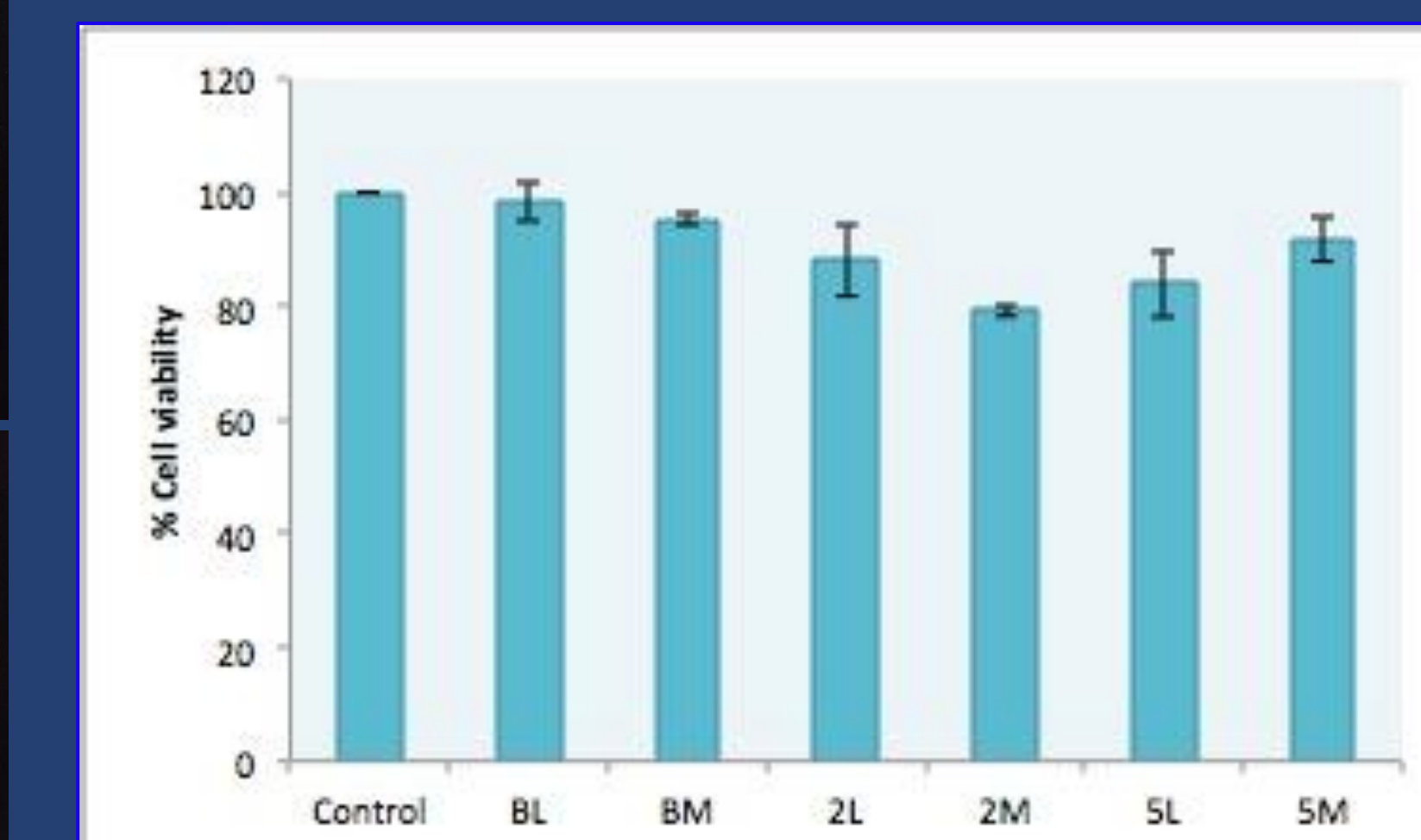
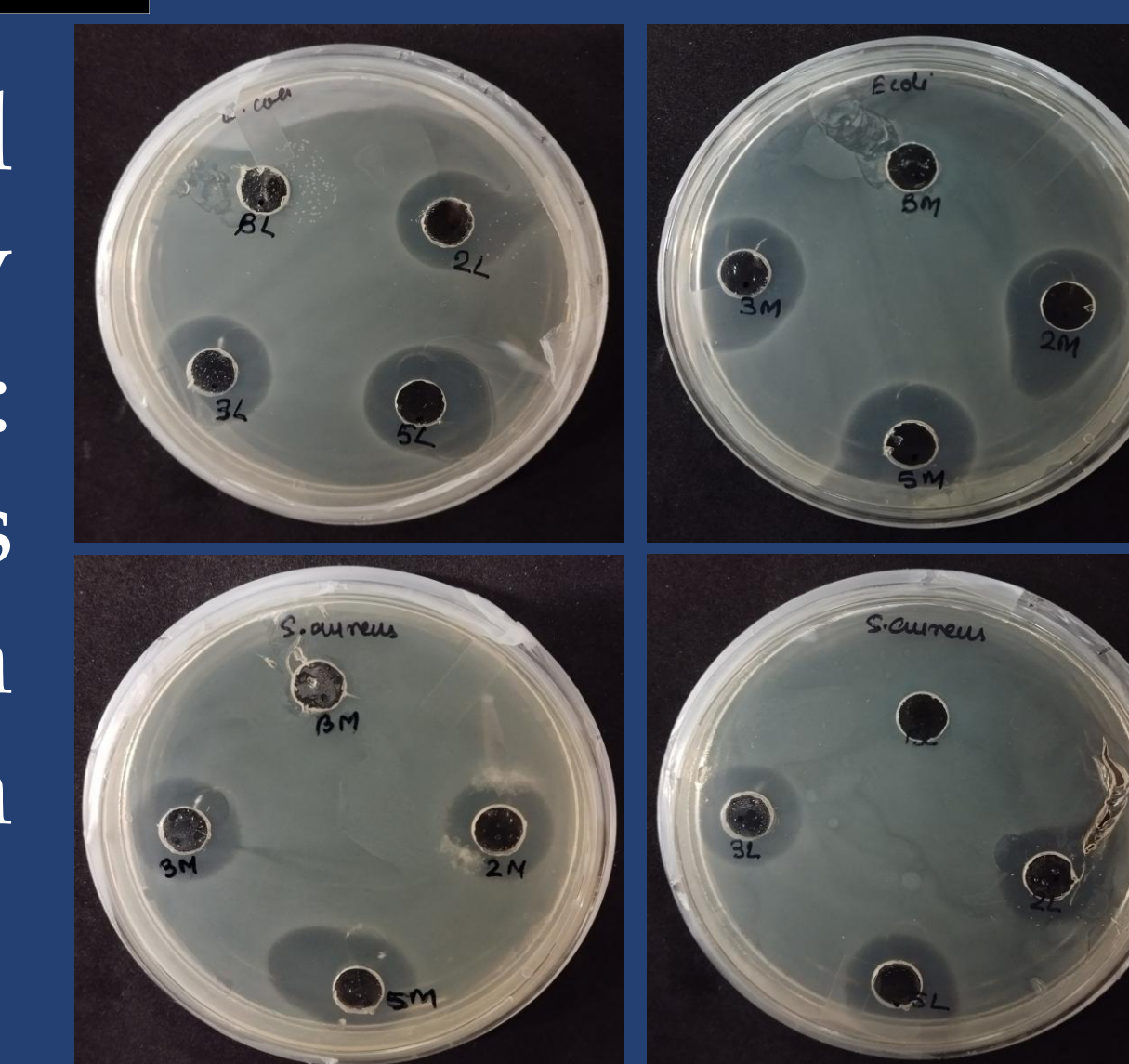


E-SEM micrographs of the sponge [2%Alg_2%Chit(L)_5%CaCl₂] showing porous structure

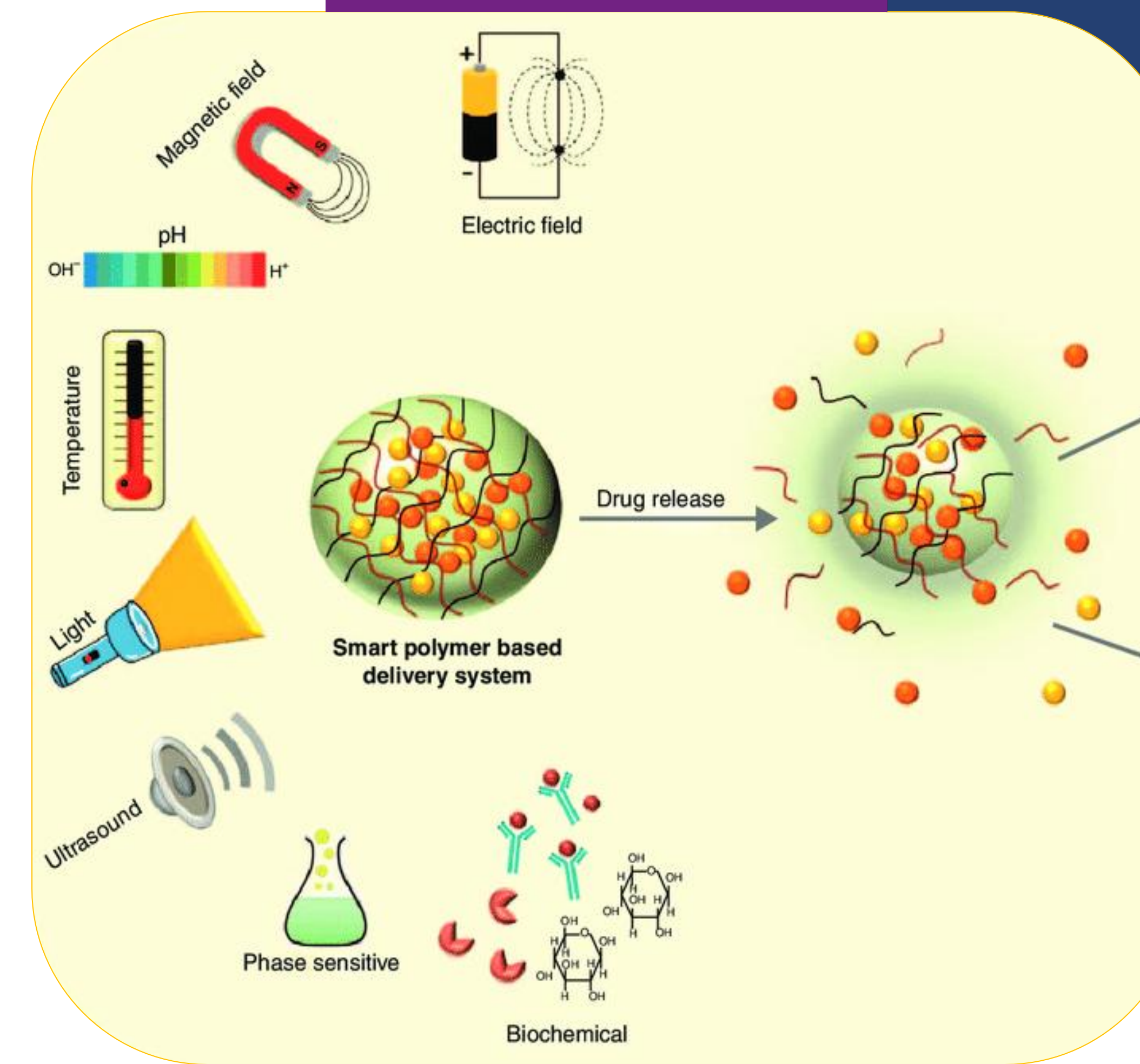


Structural integrity of biopolymeric sponges under physiological conditions: Coated Sponges >>> Cross-Linked Sponges

Antimicrobial Susceptibility Test: The drug is released from the system



MTT Assay shows 85% Cell viability



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