Docket #: S23-051

Controlled release of bacteriophages and antibiotics using hydrogels to treat infections

Stanford researchers have developed aldehyde-containing hydrogels that release bacteriophage, with or without antibiotics, over a controlled and sustained manner to treat infections including orthopedic joint infections, wound infections, ear infections (chronic suppurative otitis media), and osteomyelitis.

Antibiotics alone are unable to treat multidrug resistant infections. Bacteriophage, viruses that kill bacteria with high specificity, offer an alternative approach to treating infections. However, intravenous or bolus delivery of bacteriophage has not been effective due to lack of local targeting over long times. This invention addresses this challenge by delivering bacteriophage locally with hydrogels in a sustained manner. Dynamic imine bonds between bacteriophage and the hydrogel mediate slow release of the bacteriophage and the release kinetics can be controlled by varying hydrogel composition.

Stage of Development
Pre-clinical

Related Technology:
Stanford Docket - S20-117 Controlled Release of Bacteriophage to Treat Implant Infections

Figure:

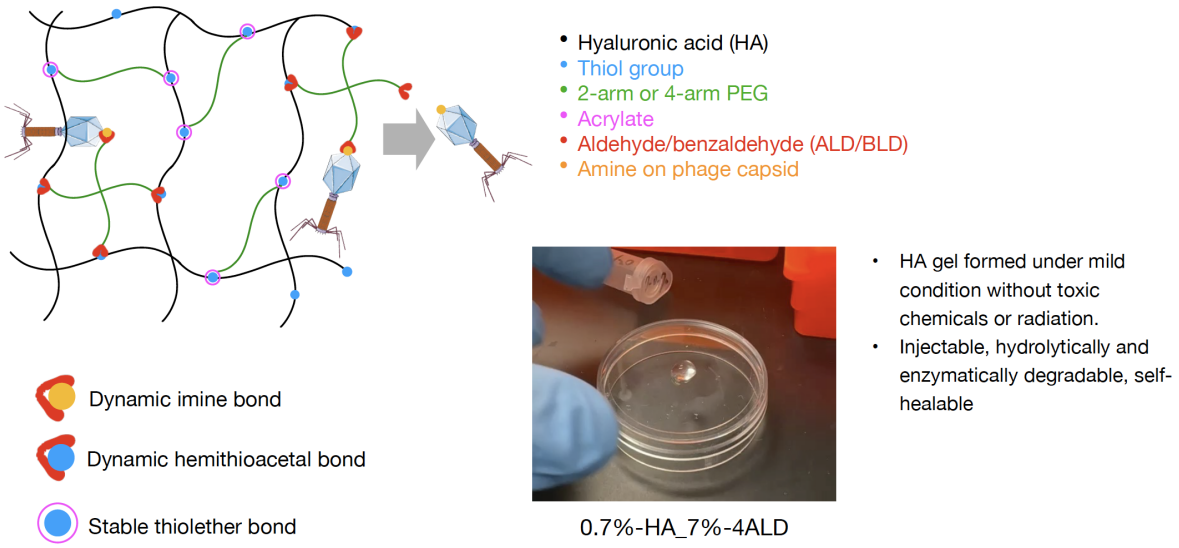


Figure description: New approach: hemithioacetal and thiolether crosslinked hydrogel (*image credit: the inventors*).

Applications

- **Treatment for many infections** including but not limited to: orthopedic joint infections, wound infections, ear infections, and osteomyelitis
- Can be co-delivered with antibiotics

Advantages

- **Novel -** no current method for local and controlled release (days to weeks) of bacteriophage
- **Tunable -** ratio of benzaldehyde to aldehyde can be modulated to control the kinetics of release of the phage
- **More efficient than antibiotics alone** for chronic antibiotic resistant biofilm infections
- **Easy hydrogel delivery -** Injectable, hydrolytically degradable, self-healable

Patents

- Published Application: WO2024192248

- Published Application: 20260256852

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