School of Chemical Engineering

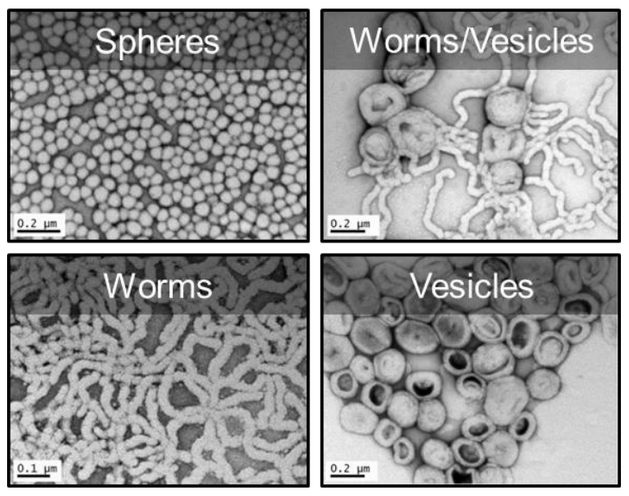
Antimicrobial Polymer Nanoparticles: The Next Generation of Antibiotics

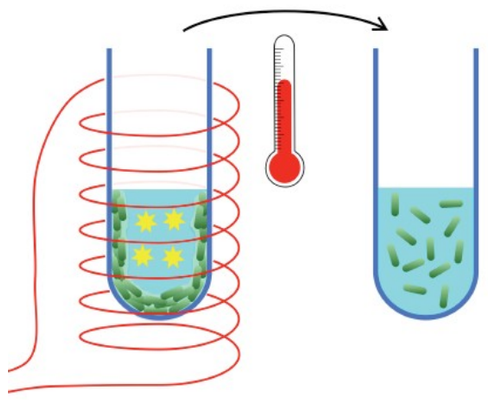
The prolonged misuse of antibiotics has led to the rise of multidrug resistance in bacteria, which is now considered a critical global issue. By 2050, it is anticipated that drug-resistant infections could cause millions of deaths worldwide, while costing the global economy up to $100 trillion.

Our Goal

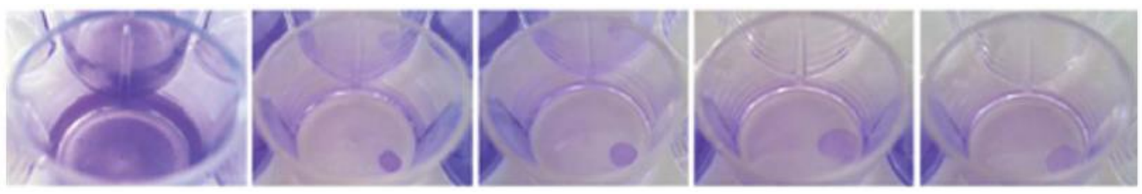
To develop novel antimicrobial polymer particles to combat the rise of antibiotic resistance using state-of-the-art synthetic polymer chemistry.

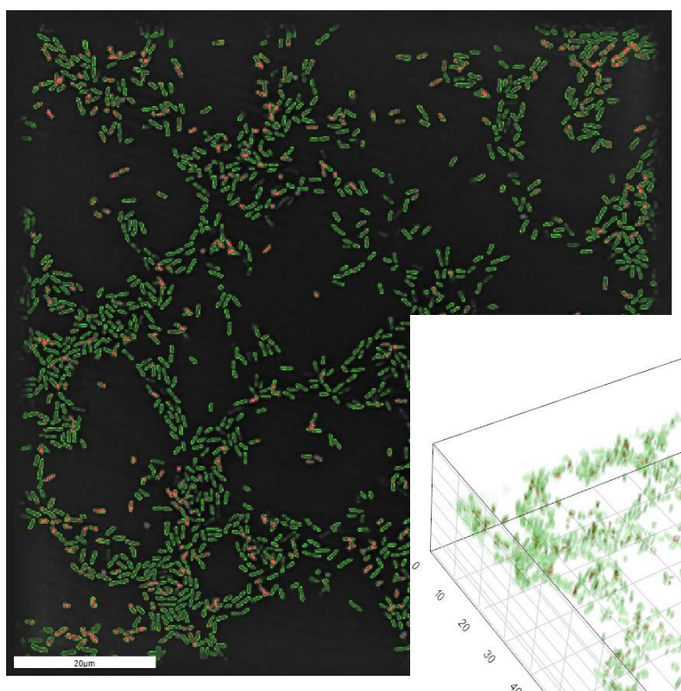
The nanomaterials not only exhibit excellent antimicrobial activity, but also biocompatibility.



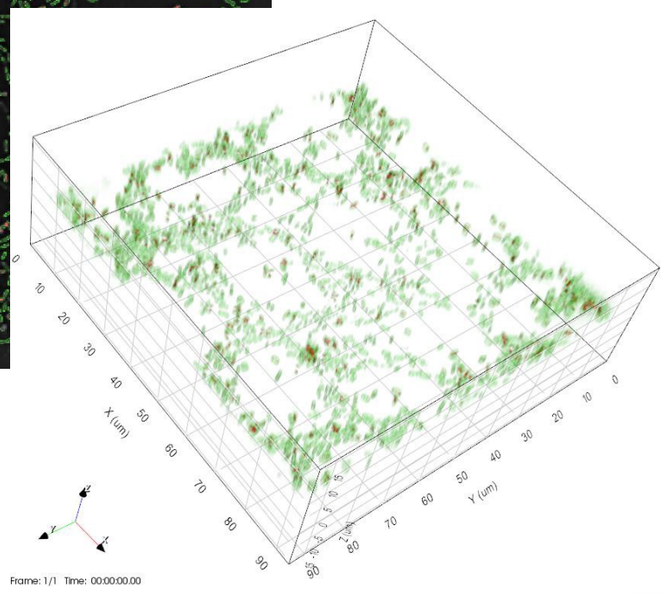


Hyperthermia-induced biofilm dispersal using inorganic-polymer hybrids



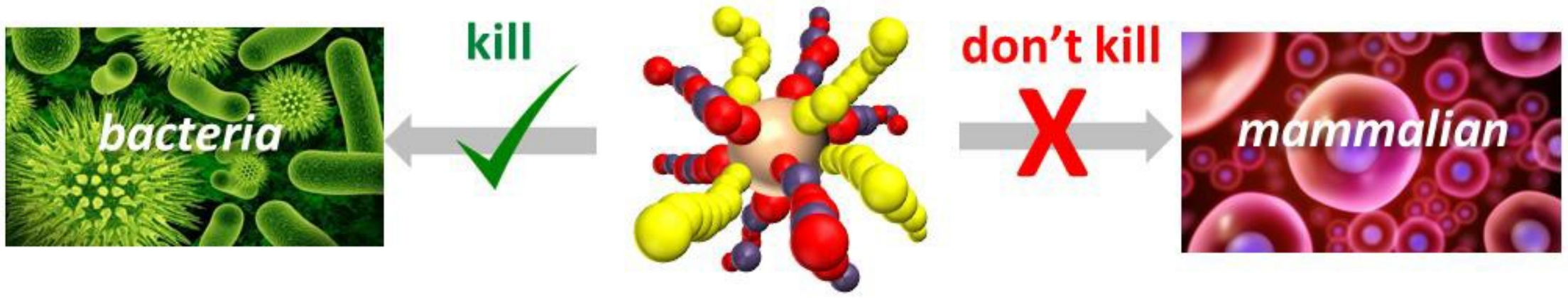


High resolution imaging



Innovations

- Nitric oxide (NO) delivery systems for effective biofilm eradication
- Antibiotic-polymer conjugates and inorganic-polymer hybrids for synergistic antimicrobial action.
- Polymer nanoparticles that selectively kill bacteria and biofilm with minimal resistance.



Reference: C. Boyer and co-workers; Anti-Biofilm Polymer, *Patent Application* No. PCT/AU2015/000162; C. Boyer and co-workers Scientific Report 2015; 5: 18385 and *Chemical Science* 7 (2), 1016-1027

A multidisciplinary and international team: **A/Prof Cyrille Boyer, Dr Edgar Wong and Dr Jiangtao Xu**

- **A/Prof Cyrille Boyer** is the deputy director of Australian Centre for Nanomedicine and was awarded the Prime Minister's Prize for Physical Science in 2015, LeFevre Memorial Award (awarded by Australia Academia of Science) in 2016 and several international awards.
- **Dr Edgar Wong** awarded his PhD in the School of Chemical Engineering (University of New South Wales).
- **Dr Jiangtao Xu** awarded his PhD in the Department of Macromolecular Science (Fudan University).

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