Developing Bioimaging Agents to Study Bacteriophages

Sandia National Laboratories

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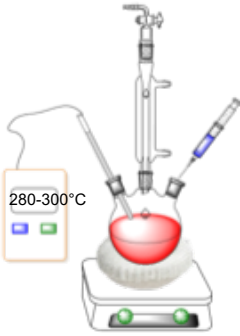
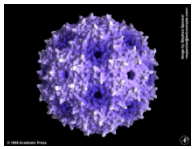
Problem: There is a need to combat antibiotic resistant bacteria. Phage therapy is one approach to solve this issue.

Goal: Develop nanoparticle imaging agents that attach to MS2 bacteriophage (bacteria viruses) in order to understand distribution within *in vivo* and *in vitro* models. QDs will enable tracking of nanoparticle-bacteria phage therapeutics.

Methods:

- Synthesis of CdTe/ZnS QDs using SPPT.
- Modification of surface chemistry using ligand exchange.
- Bioconjugation of QDs with MS2 bacteriophage using EDC/NHS coupling.





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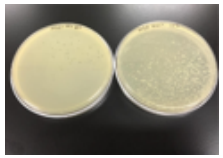
Results:



- Synthesized quantum dots through SPPT and varying time to change luminescence.
- QD were made aqueous via ligand exchange.
- Plaque assays used to determine MS2 viability indicate that QD coupled phage is still capable of infecting bacteria.

Future studies:

- *In vivo* studies of bioconjugated QD-MS2 bacteriophage.
- Investigation on various nanoparticle bioimaging agents.

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