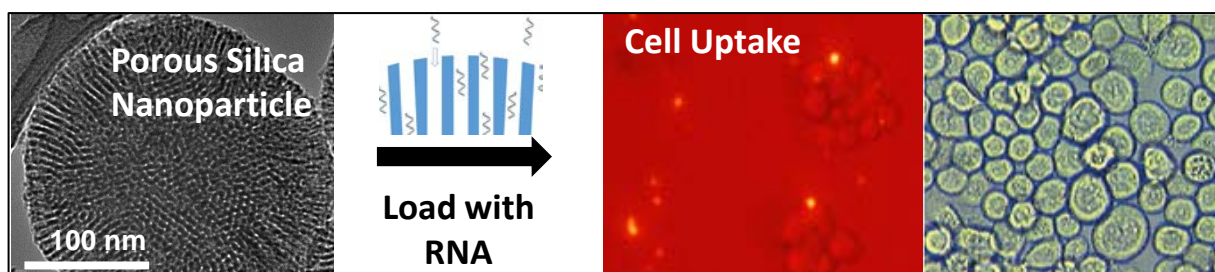


## METHODS

### Enveloped porous nanoparticles for RNA delivery to insects



#### DESCRIPTION

Porous silica nanoparticles (pSNPs) may provide a tunable carrier for the delivery of RNAs to insects, toward expansion of RNA interference-based pest management. Loading of the RNA in silica nanopores may resolve concerns regarding RNA stability and release during delivery to insects. The goal of this project is to investigate the uptake and delivery of functional RNA to insect cells using tailored pSNPs.

We have demonstrated that pSNPs are a versatile platform to test the effect of surface functionalization and pore size on nucleic acid loading and subsequent uptake by insect cells. Nanopores (5-7 nm diameter) are accessible to RNA throughout the particle (170 nm diameter) and enhance the loading and protection of RNA. Versatile screening techniques for nanoparticle uptake in insect cell suspensions have been developed with fluorescently tagged pSNPs, allowing us to link pSNP surface properties, RNA loading, and the efficiency of cell uptake. Functional RNA response was observed for pSNP carriers loaded with RNA targeting *inhibitor of apoptosis*, efficiently inducing apoptosis in Sf9 cells.

#### HOW THIS IS DIFFERENT THAN RELATED RESEARCH

Studies of silica nanoparticle carriers for RNA have primarily focused on delivery to mammalian cells, often targeting cancer cells. Only recently have nanoparticle synthesis techniques advanced to provide a pore size sufficient to load RNA and a controlled spherical particle of a size appropriate for cell uptake. This allows for examination of the role of pore size on RNA loading, protection, and release. By bringing together a team of researchers with expertise in entomology, biomolecular interactions and advanced materials synthesis, materials are being designed that specifically overcome some of the challenges associated with developing carriers for RNA delivery to insects.

#### MEMBER BENEFITS

- New approaches to deliver RNA to insects utilizing porous carriers
- Multi-disciplinary expertise applied to nanoparticle design for insect delivery applications.
- Understanding of the role of nanopores in loading and protecting RNA that can be broadly applied to delivery to insects.