Cell-Material Interactions

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Biography

- **PhD, Purdue University**
- **MS, Biological & Agricultural Engineering, Purdue University**
- **BS, Biological & Agricultural Engineering, Kansas State University**

Key Publications

- T. Sarkhosh (D), X. Zhang, K.L. Jellison, S.S. Jedlicka (2019) "*Calcium-mediated biophysical binding of Cryptosporidium parvum oocysts to surfaces is sensitive to oocyst age*." Applied and Environmental Microbiology, 85(17): e00816-19

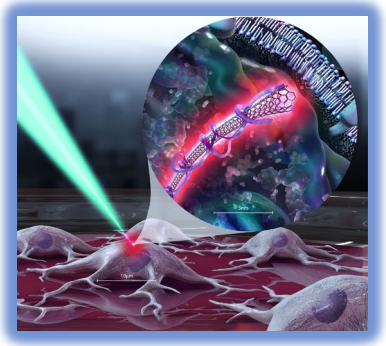
- M. Pirbhai (D), S. Chandrasekar (D), Zheng, M. (I), Ignatova, T. (P), Rotkin, S.V., **Jedlicka, S.S.** (2019) "Augmentation of C17.2 neural stem cell differentiation via uptake of low concentrations of ssDNA-wrapped single-walled carbon nanotubes." *Advanced Biosystems* 3(4): 1800321.

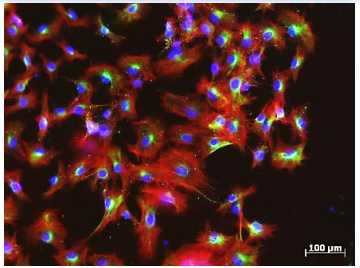
- T. Ignatova (P), S. Chandrasekar (G), M. Pirbhai (G), S.S. Jedlicka, S.V. Rotkin (2017) "Micro-raman spectroscopy as an enabling tool for long-term intracellular studies of nanomaterials at nanomolar concentration levels." Journal of Materials Chemistry B, 5(32): 6536-6545.

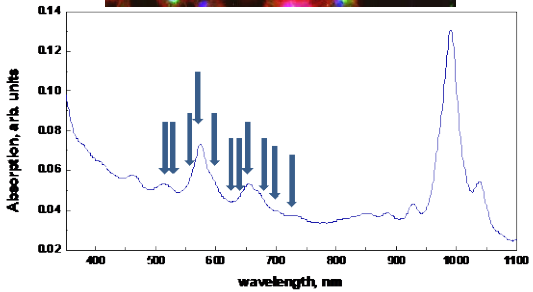
Keywords – cell-material interactions, nanotechnology, cell differentiation

Nanomaterial/Stem Cell Interactions

- **What is being studied?**
  - How do insignificant concentrations of carbon nanomaterials influence neural stem cell differentiation?
- **Why is the topic significant?**
  - The uptake mechanisms and downstream interactions of nanomaterial uptake have been shown to increase differentiation yield by 10 fold
  - Nanomaterials have significant drug delivery and regenerative medicine potential
- **How do we study it?**
  - Confocal Raman Microscopy/Spectroscopy
  - Biomolecular Analysis
- **Future Directions**
  - Identification of differentiation pathway disruption
  - Pathway modeling & targeting







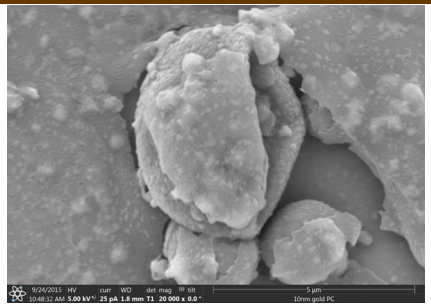
Waterborne Pathogens

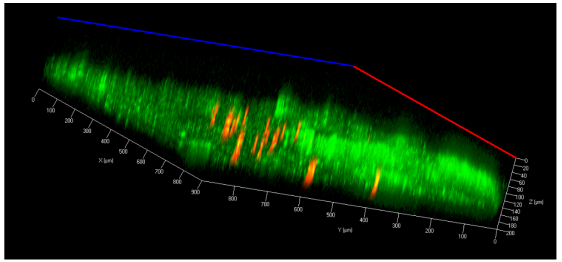
- **What is being studied?**
  - *Cryptosporidium* fate, transport, and detection in environmental and physiological systems

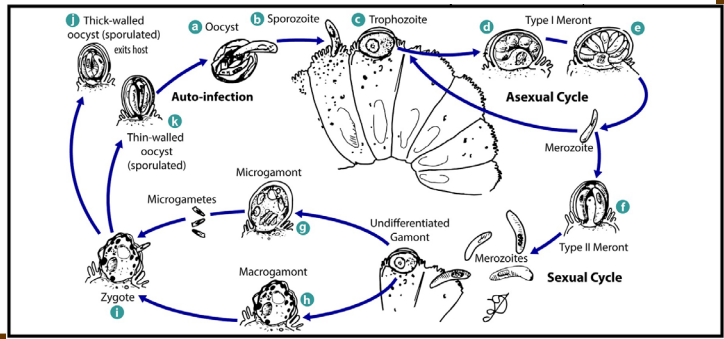
- **Why is the topic significant?**
  - *Cryptosporidium* is not removed by traditional water treatment methods, and can cause severe gastrointestinal disease.
  - The biophysical characteristics of the pathogen are not well understood and could yield insight into therapies and rapid/cheap detection methods.

- **How do we study it?**
  - Force Spectroscopy, Electron & Confocal Microscopy
  - Biomimicry of environmental and physiological systems

- **Future Directions**
  - Development of cheap/rapid detection method
  - Development of a physiologically relevant infection model

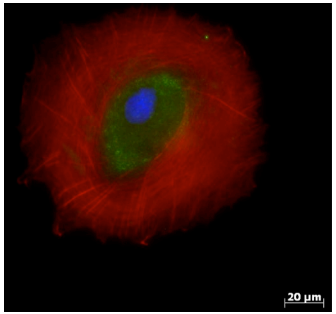






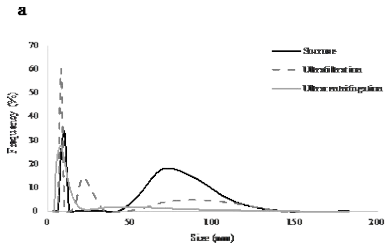
Stem Cell Derived Therapeutics

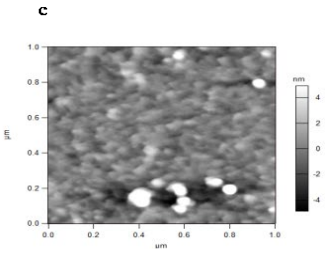
- **What is being studied?**
  - Human Mesenchymal Stem Cells – patient variability
  - Human Mesenchymal Stem Cells – potential production of exosomes



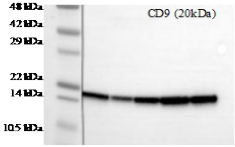
- **Why is the topic significant?**
  - MSC therapies are being offered in clinics across the nation as autologous transplants. System to system variability is significant, and patient outlook is positive, but not without risk.

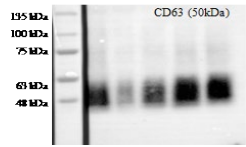
- **How do we study it?**
  - Biomolecular Analysis
  - Variable Culture Conditions
  - Microscopy





- **Future Directions**
  - Development of a high-yield production platform for ”designed” exosomes
  - Development of rapid diagnostic to indicate likely patient outcome





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