

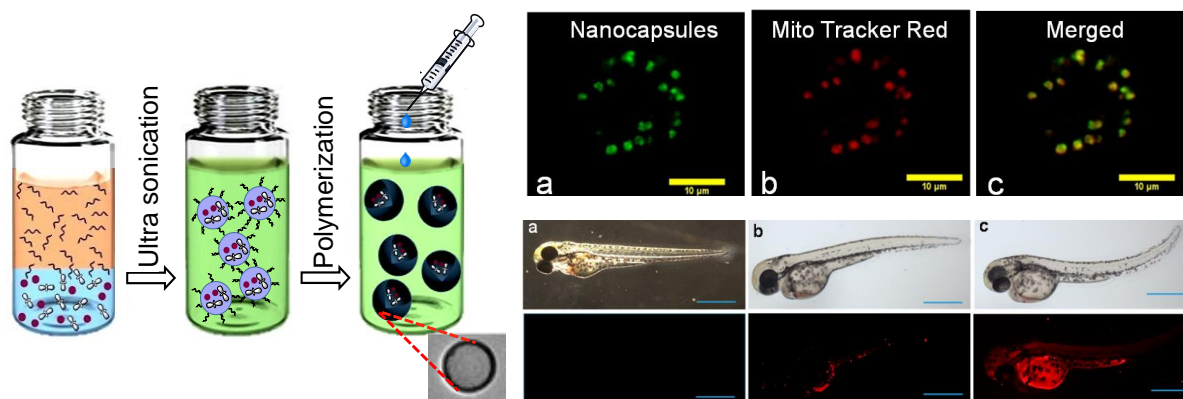
3 rd Asian Conference on Chemosensors and Imaging Probes (AsianChIP – 2019)

Advanced stimuli-responsive nanocapsules for therapeutic applications

Sumit Kumar Pramanik

CSIR-Central Salt and Marine Chemicals Research Institute, Bhavnagar, Gujarat 364 002, India

Stimuli-responsive polymer nanocapsules (PNCs) are smart nanocarriers that encapsulate functional payloads and release them on demand upon external triggers. Stimuli-responsive PNCs are of interest in a wide range of disciplines such as nanomedicine, agriculture, and materials science. Studies on stimuli-responsive PNCs so far are widely reported but are mainly focused on using only one stimulus to release one payload. However, a nanocarrier is efficient if distinct payloads can be selectively released *via* different stimuli at the desired site because unwanted and unspecific release can be avoided. Additionally the surface functionalization of the nanocapsules is also possible either within the cross-linker, exploiting the versatility of the phosphorus chemistry, or via coupling to the capsules' surface. The recent progress of stimuli-responsive PNCs that possess enhanced capabilities for payloads delivery, including PNCs that respond to multiple stimuli, stimuli-responsive PNCs that co-encapsulate different payloads and stimuli-responsive PNCs that release the payloads selectively or in a pulsatile way will be discussed.



1. Pramanik, S. K.; Pal, U.; Choudhary, P.; Singh, H.; Reiter, R. J.; Ethirajan, A.; Swarnakar, S.; Das, A., Stimuli-Responsive Nanocapsules for the Spatiotemporal Release of Melatonin: Protection against Gastric Inflammation. *ACS Applied Bio Materials* **2019**.
2. Pramanik, S. K.; Sreedharan, S.; Singh, H.; Khan, M.; Tiwari, K.; Shiras, A.; Smythe, C.; Thomas, J. A.; Das, A., Mitochondria Targeting Non-Isocyanate-Based Polyurethane Nanocapsules for Enzyme-Triggered Drug Release. *Bioconjugate Chemistry* **2018**, *29* (11), 3532-3543.
3. Pramanik, S. K.; Seneca, S.; Peters, M.; D'Olieslaeger, L.; Reekmans, G.; Vanderzande, D.; Adriaensens, P.; Ethirajan, A., Morphology-dependent pH-responsive release of hydrophilic payloads using biodegradable nanocarriers. *RSC Advances* **2018**, *8* (64), 36869-36878.
4. Kuypers, S.; Pramanik, S. K.; D'Olieslaeger, L.; Reekmans, G.; Peters, M.; D'Haen, J.; Vanderzande, D.; Junkers, T.; Adriaensens, P.; Ethirajan, A., Interfacial thiol-isocyanate reactions for functional nanocarriers: a facile route towards tunable morphologies and hydrophilic payload encapsulation. *Chemical Communications* **2015**, *51* (87), 15858-15861.

Bio-Sketch of the Speaker

Author name – **Dr. Sumit Kumar Pramanik**

Designation – **Senior Scientist**

Department – **Analytical and Environmental Science Division and Centralized Instrument Facility**

Institute - **CSIR-Central Salt and Marine Chemicals Research Institute**

Address - **Shree Gijubhai Badheka Rd, Takhteshwar, Vidhyanagar, Bhavnagar, Gujarat 364002, India.**



Sumit Kumar Pramanik is a senior scientist at CSIR-Central Salt and Marine Chemicals Research Institute. He received a BSc. degree with a major in Chemistry from Vidyasagar University in 2005. He then continued his studies at Bengal Engineering and Science University, where he received his MSc. in Applied Chemistry in 2007. In 2013, he received his Ph.D. degree in Chemistry from CSIR-Indian Institute of Chemical Biology. Subsequent to this, Sumit moved to Hasselt University (Belgium) for pursuing his post-doctoral research in the area of encapsulated microbubbles for use in non-invasive in situ dosimetry for radiotherapy till 2016. His research interests include the synthesis of various functional nanostructures (lanthanide nanodots, polymeric nanocarriers, hybrid nanoparticles) and their potential use in bioimaging, drug delivery, sensing, and optoelectronics. He has total 32 papers, 11 patents and 1 review article and 1 Book Chapter.