Biomedical Colloids

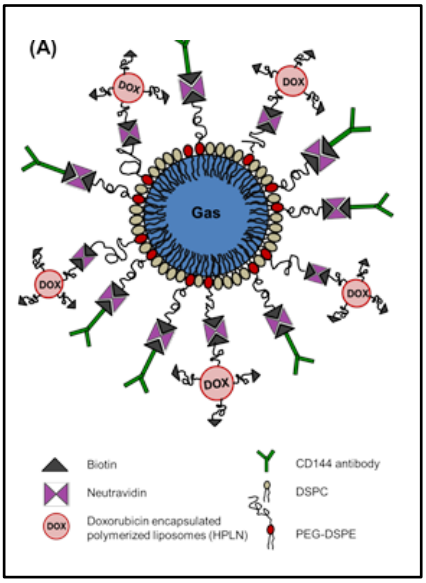
Developing colloidal systems for therapeutics and diagnostics

Yoonjee Park, PhD

One of the most important contributions to society by engineers has been the ability to control or monitor the operation of systems and devices, from machines to plants. As our healthcare system develops, the need for real-time feedback control strategies used to guide and monitor the delivery of therapies is growing. Dr. Yoonjee Park and her research team are working to be on the forefront of biomedical research by developing theranostic colloidal delivery systems.

Developing colloidal delivery systems

Dr. Park has worked to develop colloidal contrast agents for medical imaging, and drug delivery systems, or combination of the two to enhance efficiency and to aid in imaging during treatment. Biomedical colloids have been engineered as contrast agents for ultrasound, photoacoustic imaging, optical tomography, magnetic resonance imaging (MRI), x-ray computed tomography (CT) and positron emission tomography (PET). Additionally, soft matter colloids have been loaded with pharmaceutical agents to increase their therapeutic index. Combining these functionalities, theranostic biocolloids open the possibility of image-guided therapy, allowing the realization of real-time measurement, monitoring and manipulation of drug targeting.



Medical imaging technologies, such as ultrasound or MRI, are also a key component of Dr. Park's research and her focus to study contrast enhancement in imaging or to assist therapeutic delivery. Microfluidics technology is used in Dr. Park's research to produce colloidal systems or to create in-vitro tissue models to examine and understand the efficacy, or interactions, between materials.

Cluster Hiring Initiatives by the University of Cincinnati

Dr. Park was brought on by the university during a cluster hiring initiative which was born from the university's Third Century Initiative. UC's Third Century involves investments—in faculty, in staff, in alumni, and thereby, in students - as our university positions itself as a global higher educational leader in the 21st Century.

"Cluster hiring builds on UC's existing expertise in innovative ways," said Provost Beverly Davenport. "It's a strategic use of funding and a strategic way to attract more top talent to our faculty and to support the growth and success of existing collaborations."

In the next three years, more than a dozen new faculty positions will be added across disciplines that span ten colleges and related organizations at the University of Cincinnati, targeting previously identified high-impact, high-demand areas in which the university is poised to become a global leader. Dr. Park is one of those leaders. Welcome, Dr. Park!

More about Dr. Park

Yoonjee Park is an Assistant Professor in the Department of Biomedical, Chemical and Environmental Engineering at the University of Cincinnati. She received her Ph.D. in Chemical Engineering from Purdue University in 2010, where she developed stable aqueous lipid formulations with low surface tension behavior for lung disease treatment. She received her B.S. in Chemical Engineering from Seoul National University in 2006 and she did her postdoctoral training at Boston University and MIT.

Dr. Park's research interests:

- Non-invasive drug/gene delivery systems with minimal side effects
- Precise and quantitative molecular imaging
- Colloidal systems
- Regenerative medicine

Recent Publications

Park, Y. C., Paulsen, J., Nap, R. J., Whitaker, R. D., Mathiyazhagan, V., Song, Y.-Q., Hurlimann, M., Szleifer, I., and Wong, J. Y. "Adsorption of Superparamagnetic Iron oxide Nanoparticles on Silica and Calcium Carbonate Sand," Langmuir, vol. 30 (3) 784–792 (2014).

Park, Y. C.*, Smith, J. B.*, Whitaker, R. D., Pham, T., Sucato, C., Hamilton, J. A., Bartolak-Suki, E., and Wong, J. Y. "Effect of PEG Molecular Weight on Stability, T2 contrast, Cytotoxicity, and Cellular Uptake of Superparamagnetic Iron Oxide Nanoparticles (SPIONs)," Colloids and Surfaces B: Biointerfaces, vol. 119, 106-114 (2014).

Park, Y. C.*, Zhang, C.*, Kim, S., Mohamedi, G., Beigie, C., Nagy, J. O., Jeon, N.L., Holt, R. G., Wong, J. Y. "Direct Observation of Targeted Liposomal Doxorubicin Delivery via Cavitation of Blood Vessels On-a-Chip," submitted (2015).