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NanoEngineering

UC SAN DIEGO NANOENGINEERING

Thursday, February 9, 2017
Seminar Presentation: 11:00am – 12:00pm
Cymer Conference Center, SME 248

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Nanoengineering gone viral: plant virus-based contrast agents and therapeutics

Abstract:
Nanoscale engineering is revolutionizing the way we prevent, detect and treat diseases. Viruses are playing a special role in these developments because they can function as prefabricated nanoparticles naturally evolved to deliver cargos to cells and tissues. My laboratory has developed a library of plant virus-based nanoparticles; through structure-function studies we are beginning to understand how to tailor these materials appropriately for biomedical applications. Through synthetic biology, we have developed virus-based delivery system carrying contrast agents and/or therapeutic cargo enabling molecular imaging and risk stratification as well as therapeutic applications targeting cancer and cardiovascular diseases. Another avenue is the development of virus-like particle platforms for cancer immunotherapy. The idea pursued is an 'in situ vaccination' to stimulate systemic anti-tumor immunity to treat metastases, and most importantly induce immune memory to protect patients from recurrence of the disease. In this lecture, I will highlight engineering design principles employed to synthesize the next-generation nanotherapeutics using virus-based platform technology, and I will discuss the evaluation of such in preclinical mouse models and companion dogs.

Biosketch:
Dr. Steinmetz is an Associate Professor of Biomedical Engineering at Case Western Reserve University School of Medicine, Cleveland, OH. Dr. Steinmetz trained at The Scripps Research Institute, La Jolla, CA where she was a NIH K99/R00 awardee and AHA postdoctoral fellow (2007-2010); she obtained her PhD in Bionanotechnology from the University of East Anglia where she prepared her dissertation as a Marie Curie Early Stage Training Fellow at the John Innes Centre, Norwich, UK (2004-2007). Her early training was at the RWTH-Aachen University in Germany, where she obtained her Diploma (Masters) in Molecular Biotechnology. In recognition of her innovative research program, Dr. Steinmetz has won several awards; she was recognized as a 2016 American Cancer Research Scholar, a 2015 Young Innovator in Cellular and Molecular Bioengineering, a 2014 Cleveland Crain's 40 under 40 Awardee, and a 2011 Mt. Sinai Scholarship. Dr. Steinmetz serves on the Editorial Board of WIREs Nanomedicine and Nanobiotechnology; she serves on the Advisory Editorial Board for the ACS journal Molecular Pharmaceutics. Dr. Steinmetz has chaired symposia at ACS, MRS, FNANO; and she served as Chair of the Gordon Conference of Physical Virology (2015). Dr. Steinmetz has authored more than 100 peer-reviewed journal articles, reviews, book chapters, and patents; she has authored and edited books on Virus-based nanotechnology. Research in the Steinmetz Lab is funded through grants from NIH and NSF as well as Susan G. Komen Foundation, American Cancer Society, and American Heart Association. Over the past 6 years, Dr. Steinmetz has been awarded grants as PI and Co-PI totaling $8 million in total costs.