UC San Diego
JACOBS SCHOOL OF ENGINEERING
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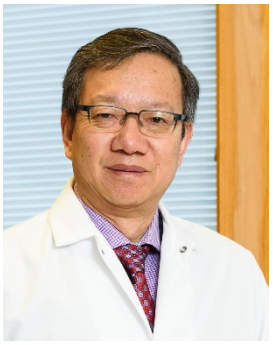
UCSD NanoEngineering/Chemical Engineering

Virtual SEMINAR SERIES

Wednesday, December 8th, 2021
Seminar Presentation: 11:00am – 12:00pm PDT



"Engineering Novel Diagnostics and Therapeutics for Precision Medicine"

Dr. Zheng-Rong Lu, PhD
Professor
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Abstract: Early detection and diagnosis of life-threatening diseases are critical in decision-making and tailoring effective treatment. Development of new therapeutics is essential to treat the patients diagnosed with the diseases and to improve their survival and quality of life. Biomolecular engineering bridges the gap between basic research and clinical needs. Our lab is focused on translational development of new diagnostics and therapeutics for early detection and effective treatment of the diseases that impair and threaten human lives. We have designed and developed novel targeted MRI contrast agents and PET tracers for molecular imaging of cancer-related biomarkers expressed in the extracellular matrix of malignant tumors. MR molecular imaging (MRMI) with the targeted contrast agents is able to detect aggressive small tumors with sizes less than 1 mm and to differentiate aggressive tumors from slow-growing tumors. Our PET tracers have shown the promise for sensitive and accurate detection and characterization of aggressive tumors. We have also developed simple and smart multifunctional delivery systems to efficiently deliver therapeutic nucleic acids, including plasmic DNA, RNA, and CRISPR/Cas9, to replace, regulate and edit abnormal genes for treating human diseases. Our smart siRNA nanoparticles are able to sense and response to the environmental changes during the delivery process to deliver therapeutic siRNA into the cytoplasm of cancer cells to regulate the expression of the oncogenes to effectively treat aggressive tumors, including metastatic and drug resistance breast cancer. Our non-viral gene delivery systems can deliver therapeutic genes into the retina to effectively replace mutated genes for prophylactic treatment of blindness.

Dr. Zheng-Rong Lu is M. Frank Rudy and Margaret Domiter Rudy Professor of Biomedical Engineering at the Department of Biomedical Engineering, Case School of Engineering, Case Western Reserve University. Dr. Lu received his B.Sc. and M.Sc. degrees in Chemistry from Lanzhou University, and Ph.D. degree in Chemistry from Lanzhou Institute of Chemical Physics, Chinese Academy of Sciences. Dr. Lu's research efforts involve molecular imaging, image-guided cancer therapy, multifunctional delivery systems for nucleic acids, and non-viral gene therapy. He has over 190 peer-reviewed scientific publications, over 25 US and international patents and pending patent applications. He is a Principal Investigator of several major grants from the NIH and private foundations. Dr. Lu serves on the scientific advisory board of several peer-reviewed scientific journal. Dr. Lu has served in numerous NIH and DOD Study Sections and grant review panels. Dr. Lu is a co-founder of start-up companies of Molecular Theranostics, and Motek Pharmaceuticals. One of his inventions, the first-in-class cancer-specific MRI contrast agent, is in clinical trials for precision cancer imaging. Dr. Lu is named a 2018 Gund-Harrington Scholar of Harrington Discovery Institute. He is a fellow of The American Institute for Medical and Biological Engineering.