



BioNIUM

Lecture Series



DR. ULI WIESNER PRESENTS:

**Ultrasmall Particle Probes for Diagnostic and Therapeutic
Applications in Oncology**

Wednesday, November 17, 2021 @ 3:30 PM

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ABOUT THE LECTURE

Despite significant promise of nanomaterials in medicine, few colloidal materials make the transition into the realm of human clinical applications. To a large extent this is due to a lack of fundamental understanding of the materials design criteria that enable save and efficient use of nanomaterials in the human body. In this presentation a class of ultrasmall multifunctional fluorescent core-shell silica hybrid nanoparticles will be introduced referred to as “Cornell dots” or simply “C dots”. These particles have sizes below 10 nm, i.e. below the threshold for renal clearance, leading to favorable biodistributions and pharmacokinetics. These poly(ethylene glycol) coated (PEGylated) probes for nanomedicine are the first dual-modality (optical/PET) hybrid nanoparticles of their class and properties receiving investigational new drug (IND) FDA approval for human clinical trials in the US.¹ In this presentation, results on C dot synthesis and characterization will be reported with focus on materials properties that facilitate translation into clinical applications as diagnostic and therapeutic probes in oncology and will include the use of C dots in unconventional therapeutic strategies against cancer involving the tumor microenvironment (TME).² The talk will finally discuss the discovery of novel silica nanoparticle topologies as well as a novel generation C dots enabling live-cell optical super-resolution microscopy.

ABOUT THE SPEAKER

Ulrich (Uli) Wiesner studied Chemistry at the University of Mainz, Germany, and UC Irvine, CA. He gained his Ph.D. in 1991 in Physical Chemistry with work at the Max-Planck-Institute for Polymer Research (MPI-P), Mainz, on holographic information storage in polymer liquid crystals. After a two-year postdoc at E.S.P.C.I. in Paris, France, on local dynamics-mechanical property correlations in polyesters, he returned to the MPI-P in 1993 where he finished his Habilitation in 1998 with work on block copolymers under oscillatory shear and block copolymer ionomers. He joined the Cornell University, NY, Materials Science and Engineering (MSE) faculty in 1999 as a tenured Associate Professor, became a Full Professor in 2005, and since 2008 is the Spencer T. Olin Professor of Engineering. At Cornell, he holds secondary appointments (field member) in Chemical and Biomolecular Engineering (CBE), Biomedical Engineering (BME), and Chemistry and Chemical Biology (CCB). Since his arrival at Cornell he has worked at the interface between polymer science and inorganic/solid-state chemistry with the goal to generate multifunctional nanomaterials for applications including energy conversion and storage, clean water, and nanomedicine. Since 2015 he is the co-director of the MSKCC-Cornell Center for Translation of Cancer Nanomedicine (MC2TCN), one of six Centers for Cancer Nanotechnology Excellence (CCNE) funded by the NCI <https://www.cancer.gov/sites/ocnr/research/alliance/ccne>