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"Innovating Health" Distinguished Speaker Seminar Series

Professor Dino Di Carlo

Armond and Elena Hairapetian Professor of Bioengineering
Chair of the Bioengineering Department, UCLA, USA



Building Laboratories on Motes of Dust to Scale Life Science Research 1000-fold

10 OCT 2025, FRI, 4 PM - 5 PM

NUS, College of Design and Engineering, Building E7, Level 3, Seminar Room 4

Hosted by: Professor Lim Chwee Teck, iHealthtech Director

Advances in biotechnology and materials science are enabling the miniaturization of laboratory assays to unprecedented scales. In this talk, I will present our work on developing "Lab on a Particle" technologies—comprising millions of microengineered particles smaller than motes of dust that function as independent, scalable and smart laboratory reaction vessels. These particles integrate sophisticated structures and biochemical functionalities at the microscopic domain, and can be analyzed and sorted using standard laboratory instruments, enabling massively parallel experimentation. I will describe the engineering behind these particles, including their fabrication, surface functionalization, and the integration of biochemical assays. The focus will then shift to transformative applications: antibody discovery, T-cell receptor (TCR) discovery, and cell-cell interaction profiling using Cell-Cell-seq. By condensing laboratory workflows onto individual particles, these technologies allow for ultrahigh-throughput analysis, accelerating the pace of therapeutic and diagnostic innovation, discovery of new drug targets, and feeding the data-hungry AIs of this era with linkages between sequence and function. Scaling research by 1000-fold with "Lab on a Particle" systems has the potential to reshape life science research, making it faster, more efficient, and capable of addressing increasingly complex biological questions.

Speaker Biography | Dino Di Carlo is the Armond and Elena Hairapetian Professor of Bioengineering at UCLA, serial entrepreneur and inventor. He serves in academic leadership roles as the Chair of the Bioengineering Department and Deputy Director of a National Science Foundation Engineering Research Center. He is an author on >200 peer-reviewed articles and an inventor on >80 issued patents in the U.S. and across the world. His research focuses on the interface between micro & nanotechnology, information technology, and the life sciences. He also has served in business leadership roles. He co-founded several companies in the diagnostics, medical device, and biotech/pharmaceutical industries and continues to serve on the board of directors of many of these companies, and as a scientific advisor and mentor to startups. His inventions are incorporated into commercial medical devices, such as Cytovale's IntelliSep™ test, which is the first test approved by the FDA to detect sepsis early in the emergency department, and Tempo Therapeutics' MAP Wound Matrix, which has been shown to regenerate tissue in humans with post-surgical wounds. Other inventions from his lab scale and automate life science research, such as Nanovial technology from Partillion Bioscience, which allows antibody drug developers to rapidly discover new antibody sequences, more rapidly bringing life-saving drugs to the clinic. He has received numerous awards, including the Presidential Early Career Award for Scientists and Engineers (PECASE), the highest honor bestowed upon young scientists and engineers in the U.S.



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