

Plenary Talk

PV IV Mon 16:30 Audimax 2

Functional Three Dimensional Mesostructures as Bioelectronic Interfaces — ●JOHN ROGERS — Northwestern University, Evanston, USA

Complex, three dimensional (3D) assemblies of micro/nanomaterials form naturally in biological systems, where they provide sophisticated function in even the most basic forms of life. In spite of their broad potential utility in man-made devices, design options for analogous abiotic 3D mesostructures are severely constrained by the comparatively primitive capabilities that are available with established tech-

niques for materials growth, assembly and 3D printing. This talk summarizes progress on strategies that rely on geometric transformation of preformed 2D functional micro/nanostructures into 3D architectures by controlled processes of actively induced compressive buckling. The emphasis is on the foundational materials and mechanics principles, computational approaches that enable inverse designs, and examples of applications in areas ranging from thermoelectrics to microelectromechanical systems to biologically inspired open mesoscale microfluidic/electronic networks as functional interfaces to 3D cell cultures, including spheroids, organoids, assembloids and mini-brains.