MAR16-2015-020091 E

Abstract for an Invited Paper
for the MAR16 Meeting of
the American Physical Society

3-D Technology Approaches for Biological Ecologies[1]

LIYU LIU, Chongqing University/Institute of Physics, Chinese Academy of Sciences, ROBERT AUSTIN, Princeton University, U.S-CHINA PHYSICAL-ONCOLOGY SCIENCES ALLIANCE (PS-OA) TEAM

Constructing three dimensional (3-D) landscapes is an inevitable issue in deep study of biological ecologies, because in whatever scales in nature, all of the ecosystems are composed by complex 3-D environments and biological behaviors. Just imagine if a 3-D technology could help complex ecosystems be built easily and mimic in vivo microenvironment realistically with flexible environmental controls, it will be a fantastic and powerful thrust to assist researchers for explorations. For years, we have been utilizing and developing different technologies for constructing 3-D micro landscapes for biophysics studies in in vitro. Here, I will review our past efforts, including probing cancer cell invasiveness with 3-D silicon based Tepuis, constructing 3-D microenvironment for cell invasion and metastasis through polydimethylsiloxane (PDMS) soft lithography, as well as explorations of optimized stenting positions for coronary bifurcation disease with 3-D wax printing and the latest home designed 3-D bio-printer. Although 3-D technologies is currently considered not mature enough for arbitrary 3-D micro-ecological models with easy design and fabrication, I hope through my talk, the audiences will be able to sense its significance and predictable breakthroughs in the near future.

[1]This work was supported by the State Key Development Program for Basic Research of China (Grant No 2013CB837200), the National Natural Science Foundation of China (Grant No 11474345) and the Beijing Natural Science Foundation (Grant No 7154221).