Abstract Submitted
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"Backpack" Functionalized Living Immune Cells[1] ALBERT SWISTON, MIT Dept of Materials Science and Engr., SOONG HO UM, DARRELL IRVINE, MIT Dept of Biological Engr., ROBERT COHEN, MIT Dept of Chemical Engr., MICHAEL RUBNER, MIT Dept of Materials Science and Engr. — We demonstrate that functional polymeric "backpacks" built from polyelectrolyte multilayers (PEMs) can be attached to a fraction of the surface area of living, individual lymphocytes. Backpacks containing fluorescent polymers, superparamagnetic nanoparticles, and commercially available quantum dots have been attached to B and T-cells, which may be spatially manipulated using a magnetic field. Since the backpack does not occlude the entire cellular surface from the environment, this technique allows functional synthetic payloads to be attached to a cell that is free to perform its native functions, thereby synergistically utilizing both biological and synthetic functionalities. For instance, we have shown that backpack-modified T-cells are able to migrate on surfaces for several hours following backpack attachment. Possible payloads within the PEM backpack include drugs, vaccine antigens, thermally responsive polymers, nanoparticles, and imaging agents. We will discuss how this approach has broad potential for applications in bioimaging, single-cell functionalization, immune system and tissue engineering, and cell-based therapeutics where cell-environment interactions are critical.

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Albert Swiston
MIT

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