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Hand-held flow cytometer for point of care CD4 testing PETER KIESEL, MARKUS BECK, NOBLE JOHNSON, Palo Alto Research Center Inc., 3333 Coyoto Hill Rd., Palo Alto, CA — Commercial flow cytometers are sophisticated analytical instruments extensively used in research and clinical laboratories. However, they do not meet the challenging practical requirements for point-of-care (POC) testing. PARC has demonstrated a new optical detection technique termed ‘spatially modulated emission’ that delivers high signal-to-noise discrimination without precision optics to enable a flow cytometer that can combine high performance, robustness, compactness, low cost, and ease of use. The detection technique has been extensively evaluated with measurements of absolute CD4+ and percentage CD4 counts in human blood. To benchmark our system we performed a direct one-to-one comparison of measurements on the same samples with a commercial instrument (BD FACSCount) and obtained excellent agreement for both absolute CD4 and percentage CD4. We have assembled the first generation of a compact ($\sim 5 \times 3 \times 2$ inch), single-parameter, flow cytometer based on the spatial modulation technique which uses a pin photodiode for detection rather than a PMT or APD. Measurements of the sensitivity and dynamic range of the prototype were conducted with 3.8- μm ultra-rainbow calibration beads (Spherotech) and yielded a detection limit of ~ 1000 MEPE, which meets the needs for a wide range of bio-particle-detection applications.

Peter Kiesel
Palo Alto Research Center Inc., 3333 Coyoto Hill Rd., Palo Alto, CA

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