Wireless monitoring of cell cultures based on light scattering: A novel optical scheme and portable prototype

Alexander E. Moskalensky¹ and Daria N. Litunenko¹

¹Novosibirskij gosudarstvennyj universitet

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Abstract

Cell cultures are widely used in scientific research, biomedicine and industry. When culturing, it is important to maintain certain conditions, including the concentration of cells. Monitoring of the culture growth and cell counting is an urgent task for the optimization of technological processes. Most existing methods require sampling from a culture flask. This procedure is time-consuming and associated with the risks of contamination. We present a device able to monitor the growth of cells number in a suspension non-invasively. The device uses a laser beam that pass through the culture flask and measures the intensity of scattered light as a function of coordinate along the beam. This optical scheme allows one to obtain accurate results for both high- and low-scattering samples. We constructed the wireless portable prototype for monitoring of cell culture growth directly in the incubator and demonstrated the applicability of the device for Jurkat cells and e.coli bacteria.

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